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FIFTEENTH REPORT

(SECOND BIENNIAL)

OF THE

STATE BOARD OF HEALTH

LAKE LIBRARY
OF THE

STATE OF NEW HAMPSHIRE

FOR THE TWO YEARS ENDING NOVEMBER 1, 1898.

MANCHESTER, N. H.

ARTHUR E. CLARKE, PUBLIC PRINTER

1899

[illegible]

STATE OF NEW HAMPSHIRE.

OFFICE OF THE STATE BOARD OF HEALTH,

STATE HOUSE, November 1, 1898.

To His Excellency the Governor and the Honorable Council:

I have the honor to present herewith the fifteenth report
of the State Board of Health.

Respectfully submitted.

Irving A. Watson

Secretary.

MEMBERS OF THE BOARD.

Gov. GEORGE A. RAMSDELL	.	.	.	Nashua.
ATT'Y-GEN. E. G. EASTMAN	.	.	.	Exeter.
G. P. CONN, M. D., <i>President</i>	.	.	.	Concord.
C. S. COLLINS, M. D.	.	.	.	Nashua.
ROBERT FLETCHER, C. E.	.	.	.	Hanover.
IRVING A. WATSON, M. D., <i>Secretary</i>	.	.	.	Concord.

REPORT.

Herewith is presented the fifteenth report of the State Board of Health, the same being the second biennial report, for the fiscal years 1897 and 1898. It is made in accordance with the policy announced in the previous issues, to wit: that the reports should be made a source of sanitary instruction to the people of the state, rather than to encumber them with technical, scientific, and statistical matter, valuable only to those who are making investigations along those lines. We have, therefore, included and discussed matters of general public interest, and have endeavored to make the same as interesting and as plain as possible. Indeed, this report contains less statistical matter than any of the former issues. Those who are especially interested in vital statistical investigations will find every available fact in the Registration Reports. A few statistics are herewith presented that serve to emphasize the need of, or the results of, preventive measures in certain diseases.

The report represents only in a very small degree the actual work of the board, inasmuch as all correspondence, action in certain local cases, etc., etc., is omitted in order to give place to matter of greater public interest.

LOCAL BOARDS OF HEALTH.

The sanitary work throughout the state is accomplished almost entirely through the local boards of health. Under the provisions of the Public Statutes every town has a board of health composed of three members. Some of the cities have under their charters a differently organized health depart-

ment, and in a few instances special precincts, with health officers of their own, have been chartered by the legislature.

The aggregate work done by the local boards of health is very great, and is of vast importance to the physical and material prosperity of the people. Many towns have active, efficient boards, while a few others either do not appreciate the importance of sanitary work, or else do not pay their boards a sufficient amount to allow them to engage in such work to any extent. In not a few towns boards of health are restricted in the performance of their duties as health officers because the town refuses to allow them fair compensation for such work. However, comparing the status of local boards of health today with the boards as they existed ten or fifteen years ago, there has been a wonderful advancement, with equally remarkable results. This is exemplified in every progressive town in the state by improvement in public water supplies, in sewerage, in general cleanliness, in isolation of contagious and infectious diseases, in the better knowledge of disinfection, and above all in the more enlightened understanding by the public as to what sanitation is and its advantages.

The law which was passed a few years ago, making boards of health practically continuous by the appointment of one member annually, the tenure of office being three years, has greatly improved the efficiency of our local boards of health.

NEW HAMPSHIRE ASSOCIATION OF BOARDS OF HEALTH.

Two years ago the state board of health issued a call for a meeting of local health officers, and as a result the New Hampshire Association of Boards of Health was organized October 14, 1896, since which time it has held two meetings annually. At these meetings valuable papers were read, followed by interesting discussions of public health questions, including executive sanitary work by local health officers.

The papers and discussions of the first meeting were published in a little volume entitled, "Transactions of the New Hampshire Association of Boards of Health." During the

past year the papers presented at the meetings of this organization have been printed in the "New Hampshire Sanitary Journal," and the more important ones are included in this report. The latest meeting of the association, convened while this report is in press, was, perhaps, more interesting and important than any hitherto held.

The importance of this association is apparent to all who attend its meetings, and if every health officer in the state would become a member of it, the sanitary service of the state would be greatly improved by the increased knowledge thus acquired.

We commend this organization without hesitancy to the members of all local boards of health, and urge their attendance whenever possible for them to do so.

CONSUMPTION.

It is with pleasure that we are able to announce that the mortality from consumption is being gradually reduced in New Hampshire. In verification of this statement we would call particular attention to the statistics and diagrams presented elsewhere in this report. The death statistics of this disease from 1884 to 1897, inclusive, are given, together with diagrams showing the yearly variations in the mortality, and a considerable diminution in its death rate during the later years of the period under observation.

That consumption is very largely a preventable disease is no longer considered a debatable question. It has been demonstrated beyond controversy, and it is doubtless through a better knowledge of the character of the disease and the importance of sanitation that the decrease in the death rate has been brought about.

Consumption still remains, however, the most fatal disease in the state, and its nature should be understood by every individual. We have in this report given considerable space to this subject, as we have also done in previous reports. Since our last report was published, the board has had printed and distributed several thousand copies of a pamphlet on "The re-

striction and prevention of consumption." (See page 32.) Many boards of health and private individuals have voluntarily assisted in the distribution of this circular. We wish a copy might be placed in the hands of every family in the state. With a proper understanding of the nature of this disease its death rate might, we believe, be reduced to very small proportions compared with the present great mortality.

TYPHOID FEVER.

Typhoid fever is one of the diseases in which sanitary work has wrought a very marked reduction within the past thirty years. Although we have no statistics to show the mortality from this disease a quarter of a century ago, yet the testimony of living physicians who were in practice then, as well as the current literature of the time, is to the effect that it was very much more prevalent then than now.

We have considered this disease elsewhere, and are able to show by actual figures that the death rate is being gradually reduced. A glance at the diagram on page 51 will show the downward tendency of the mortality rates during the past fourteen years,—the result of sanitary work. We have also issued a pamphlet on "The prevention and restriction of typhoid fever," for public distribution. (See page 57.)

OTHER COMMUNICABLE DISEASES.

Elsewhere we give important facts in connection with the mortality from diphtheria and croup, scarlet fever, measles, whooping cough, cholera infantum, pneumonia, bronchitis, and influenza.

The discussion of these various diseases must be considered as authoritative, since it is based upon the actual death returns.

THE REGISTRATION REPORT.

The report of the registration and return of births, marriages, divorces, and deaths is made biennially and contains a large number of statistical tables, in which all the facts con-

nected with the individual return are shown so as to be available for study along any line, special or general, connected with the subject.

The report is not, perhaps, of especial public interest, but as a guide to sanitary work, and in showing the movement of the population of the state, it is invaluable. Without it, it would be impossible to determine many questions relating to public health work which are now definitely settled or indicated by these statistics,—indeed, a health department would be working almost in the dark without mortality statistics to show where sanitary work was most urgently required, as well as the results of such labor.

Through the knowledge conveyed by these reports, we now know just where every death from every known disease occurs; we also know the average annual mortality in the aggregate, and if there is any marked variation from these averages, we know at once that there must be some local cause for it. For instance, if the mortality rate from a given disease in a given locality is in excess of certain averages, we know that there is some local cause for it; that there is urgent need for sanitary work in that locality; that some serious sanitary defect exists.

PRESERVATION OF RECORDS.

Not the least in importance, in connection with the registration of births, marriages, divorces, and deaths, is the personal record. In this department we have at the present time not far from 300,000 individual records of persons who have lived, or are now living, in the state of New Hampshire. These records give the more important historical facts in connection with the individual, such as date of birth, marriage, death, names of parents, residence, occupation, etc., and their preservation is often of importance in the maintenance of legal rights in cases where it becomes necessary to prove a birth, parentage, the marriage, and the death of a person.

Until recently no provision had been made for filing these records so as to make them available for reference, and there has been much complaint in consequence. We are pleased to

announce that suitable filing cases are now being constructed, and that in all probability the records will be in proper shape before the close of another year.

LUNACY.

The State Board of Health constitutes a State Board of Commissioners of Lunacy, which issues a biennial report, embracing a return of commitments, discharges, and deaths at all the institutions in the state in which insane persons are confined.

The most important provision of the law is that which authorizes the board to commit to the New Hampshire Asylum for the Insane, for remedial treatment, such indigent insane persons as, in its judgment, would be benefited by such treatment, the expense being borne by the state. This is a most beneficent law, and embodies a principle which we believe should be carefully maintained by the state. Under it, remedial treatment has been provided for many an unfortunate person to whom it would not otherwise have been possible, and it has also brought inexpressible relief to many families.

The percentage of recoveries, as shown by the several reports of the board, is exceedingly gratifying and fully warrants the expenditure which the state is making in this direction. By an act of the legislature of 1897, a limit of \$16,000 was placed upon the appropriation available for the support and remedial treatment of the indigent insane, under the direction of this board. At the present time the board is able, by a careful scrutiny of the cases and the prompt discontinuance of state support at the earliest possible moment, to keep the expenses within the limit prescribed.

The Public Statutes provide that all insane persons who have been supported at the New Hampshire Asylum for the Insane for a period of twenty years, at private expense, shall thereafter be supported at that institution at the expense of the state. There were, at the time the legislature limited the expenditures of the board, twelve such cases, the maintenance of whom was charged to the board of commissioners of lunacy.

Upon presenting the facts to the attorney-general, he decided that such cases were not properly chargeable to this account. Had it not been for the reduction in the number of cases, by reason of the transfer of these twenty-year cases to another account, the sixteen thousand dollars appropriated would not meet the demands upon the board.

During the year just closed, the state paid for the maintenance of the insane committed by order of this board, \$15,-188.46. The expenses of the commission, including clerical work, printing of blanks, etc., amounted to \$604.38. For additional facts in connection with this work, reference may be had to the biennial report of the board.

THE CATTLE COMMISSION.

Since the secretary of the state board of health was, by legislative enactment, made a member of the State Board of Cattle Commissioners, its work may be considered to be closely allied with that of the former. This is particularly true since the chief function of the commission is to prevent the spread of tuberculosis.

The identity of tuberculosis in animals and the same disease in man is fully established, and the fact that the disease in one is communicable to the other makes the work of eradicating tuberculosis in animals of great importance to public health as well as to stock-raisers.

The course pursued by the commission has been a conservative one, in which the general plan has been to destroy only such animals as were found to be tuberculous upon a careful physical examination. The work has been carried on almost wholly by the able and efficient secretary, Hon. N. J. Bachelder, and at an expense, including indemnity for animals destroyed, of but a little more than one half of the available appropriation.

The position taken by the commission with reference to this disease is outlined in a paper in this report, entitled, "Bovine Tuberculosis." For a detailed account of the work of the commission, number of animals destroyed, etc., etc., reference should be had to the biennial report.

SUMMER RESORTS.

The sanitation of summer resort localities is of vast importance to the state of New Hampshire, inasmuch as the income derived from the summer visitor adds very largely to the prosperity of the state, and this cannot be maintained without most careful attention to details,—particularly to the question of public health. This fact is now so well understood by hotel proprietors and others who are seeking and serving the summer visitor, that a careful watch is kept over every avenue through which disease might appear.

From time to time, inspections of the leading summer resort hotels have been made by this board, important improvements suggested and carried out, until today they are, as a whole, in a good sanitary condition. The knowledge that the outbreak of a disease like diphtheria, typhoid fever, or, in fact, any other communicable disease would immediately cause an exodus from the locality, as far as visitors are concerned, has led to a careful supervision to prevent such an event. To provide against such a contingency the services of this board have not infrequently been sought. Elsewhere will be found a report by the president of this board upon a few of our summer resort hotels.

LEGISLATION NEEDED.

First. We believe that the time has arrived when the state should establish and maintain a hygienic laboratory, to be devoted to chemical and bacteriological investigations in the interests of public health, and to protect the people against commercial frauds in the line of food products, etc., which, through the lack of means to enforce the law which we already have upon our statute books, have been thrown upon our markets. We believe the people of the state should be protected against such frauds. A laboratory should be available for such examinations as have been alluded to, and also for the examination of public water supplies, and for the bacteriological diagnosis of diphtheria, typhoid fever, tuberculosis, etc., etc. Such laboratories are now maintained by many

states, and by most of the large cities of the Union. The Vermont legislature has recently appropriated \$5,000 to equip a laboratory of this kind, and \$8,000 annually for its support.

We are of the opinion that satisfactory work along these lines could be maintained in New Hampshire for an amount somewhat below these figures. We believe the subject is of sufficient importance to the health and commercial interests of the state to receive careful consideration at the hands of the legislature.

Second. Further legislation seems to be necessary for the protection of our public water supplies, particularly where the source, or a part of it, is outside the immediate control of the municipality using it. While there is a general law against the pollution of water used for domestic purposes, it is necessary at times to establish regulations to govern local conditions liable to endanger the water, and this contingency is not sufficiently provided for by statutory law at the present time. To illustrate: Local regulations made by the town of Sunapee, for the protection of Sunapee lake against pollution, can be enforced only within the limits of that town, while similar conditions may exist unrestricted on the shores of the lake in Newbury and New London. This is cited simply as an example. There are other localities in which there is urgent need for some legislation to cover just such a condition as cited above, and which might be met by a carefully prepared bill, embodying specific measures sufficiently exact and stringent to protect any and all public water supplies, or authorizing the State Board of Health to make and cause to be enforced such regulations as it might deem necessary to protect any given supply.

Third. A law should be enacted to regulate the practice of plumbing, to take effect only in such cities and towns as might adopt it. In most towns of the state a law to regulate the practice of plumbing would be totally impracticable and useless; but in some of the cities and larger towns it would be of great advantage and is almost a public necessity. The measure should permit such towns as might adopt it to estab-

lish such rules as would secure good and safe work, thereby reducing to a minimum the great danger to health which results from defective plumbing.

Other measures, bearing to a greater or less extent upon public health matters, will doubtless be presented, but those above alluded to impress us as being of more than ordinary importance.

RAILROAD SANITATION.

Within the past ten years very great improvements have been made by the railroad corporations in the reconstruction of old stations, or building of new ones; in the beautifying of grounds about stations, and in the more careful supervision than heretofore of general sanitary conditions. Each year shows a marked advance in this direction, and it indicates that the managers of our railway systems realize the importance of good sanitation. It has been necessary only to call their attention to sanitary defects to secure prompt action, either by the local agent or by the general management.

Our railway stations and grounds were never before in so good condition as now, and it is a pleasure to announce that the greatest railroad corporation in the state takes a progressive view of the importance of good sanitation, particularly with respect to its bearing upon the summer travel interests of New Hampshire.

SPECIAL PAPERS.

We have included in this report special papers upon different sanitary subjects, all of which we believe to be educational in character and bearing directly upon the public health interests of the state.

All of these papers merit careful reading and study, and in them will be found matters of interest relating to almost every phase of sanitation. While we commend all, we would call especial attention to the article on "Sewerage in Villages," by Prof. William T. Smith, M. D., of Hanover, for the reason that it shows how one village has successfully solved the sew-

erage problem without an appropriation from the town. There are quite a number of villages in New Hampshire in which public sewers are needed, but appropriations cannot be secured at the annual town meetings. We commend a careful consideration of the plan adopted in Hanover to all such localities.

RESTRICTION AND PREVENTION OF CONSUMPTION.

(TUBERCULOSIS.)

Since the demonstration beyond controversy that tuberculosis is a communicable disease and that certain precautions are necessary to restrict if not wholly to eradicate it, much has been written for the purpose of instructing the public in the most effective measures to reduce the prevalence and consequent mortality of this disease.

This board has discussed the subject in several of its latest reports, notably in that of 1895. But we deem it necessary to present the subject still further to the people of New Hampshire, inasmuch as consumption, as is elsewhere shown, is the most fatal disease in the state.

So confident are health authorities that this disease may be very materially reduced, more than twenty state boards of health, as well as the provincial boards of Ontario, Quebec, and New Brunswick, have issued circulars and pamphlets on the restriction and prevention of tuberculosis for distribution among the people. In all that has been written on this subject we have found nothing more to the point than a masterly paper from the pen of James B. Russell, B. A., M. D., LL. D., of Glasgow, Scotland, and from which we herewith present very liberal extracts. This paper has been published for general distribution by the state board of health of Massachusetts. In commenting upon it that board says :

“It is hoped that this paper will tend to quiet unnecessary alarm in relation to the real dangers from the infectious nature of consumption, since, while it shows very conclusively that the disease is infectious, it also shows that, with proper precaution, there is practically no danger from association, even quite intimately, with consumptives.”

TUBERCULOSIS IN GENERAL.

WHAT IS TUBERCULOSIS ?

The word tuberculosis, or tuberculous disease, is associated in the popular mind almost exclusively with phthisis or consumption of the lungs. This is by far the most frequent and most deadly form of tuberculosis; but every organ and every tissue of the body may be the seat of tuberculous disease. Hydrocephalus is tubercle in the membranes of the brain; tabes mesenterica is tubercle in the lymphatic glands of the abdomen; scrofula, in the popular sense, is tubercle in the superficial lymphatic glands, most familiar in the neck; lupus is tubercle in the skin; there is tubercle of the joints and of the bones, giving rise to suppurations in all sorts of places, and occasioning surgical operations almost as various in their nature as in their locality.

Tuberculosis is a disease, not only of man, but of the lower animals. No warm-blooded animal is insusceptible when artificially tested, but it occurs naturally with great frequency in those which are domesticated or confined, as the cow, the pig, the rabbit, in fowls, in monkeys, etc.

The only cause of tuberculosis is the tubercle-bacillus. Without the bacillus there can be no tuberculous disease. Therefore, to prevent tuberculosis, we must get rid of the bacillus. From our point of view, tuberculosis is a disease. From the point of view of the bacillus, it is a natural life-process. The bacillus has a plan of life laid down for it, providing, as usual, for the maintenance of the individual and the propagation of its kind. Clearly, it is necessary that we should understand this plan before we can hope to disconcert it. The prevention of tuberculosis rests upon the biology of the bacillus.

THE BIOLOGY OF THE BACILLUS.

The bacillus is not inherited. As regards pulmonary consumption, this statement may be taken as absolutely true. The bacillus *may* pass from a tuberculous parent into the body

of the foetus, and be born with it; and thus the offspring may carry into independent life a tuberculous process, but this fact has merely an academic interest. Tuberculosis has been actually seen in the foetus with just sufficient frequency and certainty to prove that the inheritance of the bacillus is not impossible. For all practical purposes, the hygienic administrator is bound to regard *every* case of tuberculosis as caused by infection which has taken place so to speak in the open—within the sphere of his control.

The tubercle-bacillus not being inherited, but passing into the body from the outside, how does it get there? Under what conditions does it exist there? Under what conditions does it pass from the outside to the inside of the body? Under what conditions does it live and propagate there? It is impossible to demarcate the answers to these questions as clearly as the questions themselves. In nature the facts are interlaced, but, at any rate, the questions so stated will promote clear thinking.

The bacillus multiplies by subdivision and by the production of spores. As compared with other disease-producing organisms, it grows very slowly even under the most favorable circumstances. To be effective, therefore, these circumstances must be maintained for weeks continuously. At a temperature of 86° F. growth is much enfeebled, and it entirely ceases below 82.4° F. It cannot grow at a temperature above 107.6° F. It flourishes at the natural deep temperature of the human body, viz., 99° to 100° F.* Moisture is absolutely essential to growth, with a limited supply of air and an absence of light. Obviously, we have here an aggregate of conditions which, in this country at any rate, can only be found in nature *inside the animal body*. The tubercle-bacillus cannot multiply outside the animal body; it can merely live, and live only under certain conditions, and under any conditions only for a limited time. †

When the bacillus obtains access to the body of a warm-blooded animal, which it almost solely does by the great main

* The tubercle-bacillus of fowls has a somewhat wider range of temperature.

† The bacteriologist produces those conditions artificially, and finds it a very difficult task.

entrance, the mouth, passing thence into one or other of the diverging channels, the windpipe and the gullet, it is not yet in a physiological sense inside the body. It must break through the mucous surface of these passages. This is a most important stage in the career of the bacillus from a preventive aspect, which must be dealt with at large further on. Meanwhile, let us assume that the bacillus has broken through, still it has enemies in the tissues and fluids of the body. These also have a supreme interest for us, but these also we shall meanwhile pass by. If every circumstance has proved favorable, the bacillus proceeds *slowly* to multiply, and in doing so to invade and break down the natural tissue around. It may be borne along the stream of lymph or blood, or be carried by wandering cells to other parts of the body. However it may be effected, in all movement the bacillus is passive. Wherever it establishes tuberculosis, the process has products—irritated and disorganized tissue, pus, etc. These products have the relation of foreign bodies to the healthy tissues, and have therefore an eccentric or centrifugal bias. They may, however, be imprisoned and retained, sometimes changed in nature. If the process lies on the line of the great channels by which the bacillus gained entrance, then it has an equally patent exit—in consumption, by the expectoration, or by the *fæces*, if the expectoration is swallowed. If the process is in the bowel or the kidney, or any organ having a natural exit for its products, then the morbid matter passes out thus. If the process is in bone or in lymphatic glands, or in any locality from which the nearest way outwards is through the skin, then we may have abscesses and a discharge of matter therefrom. To us this is a feature of disease. To the bacillus it is a phase in the cycle of its life. These discharges carry out bacilli and their spores; and these bacilli and their spores maintain the stock of infecting material outside the animal body upon which the continuance of the tubercle-bacillus as an individual and of tuberculosis as a disease depends.

What are the conditions which favor the continued vitality of the bacillus, and preserve the potential activity of its spores

outside the animal body ?* Although the bacillus will not grow, excepting under the conditions of heat and moisture described, it is not killed either by natural cold or heat, or by drying. It is, indeed, one of the hardiest of all disease-producing germs. Freezing has no effect. It resists putrefaction for weeks, and endures in the dry state for months. The greater stability in resisting natural agents and conditions to which other germs speedily succumb is, no doubt, compensatory for the characteristics of parasitism and slow growth. If the bacillus, being unable to grow anywhere but inside a warm-blooded animal, were also unable to survive outside, it would be exterminated. On the other hand, from the animal's point of view, the extremely sluggish growth of the bacillus, and its inability to grow outside, in a measure countervails its tenacity of life, otherwise the animal would be exterminated. Still, in spite of this tenacity of life, the combination of hostile conditions outside the animal body ultimately proves fatal to the bacillus. Direct sunlight will kill the bacillus in a few minutes, and ordinary daylight in a few days, whether it be exposed naked in cultures, or in sputum or in dust, and in each case free flowing air makes the light more active. The converse of these conditions—darkness and stagnant air—favor the bacillus.

TUBERCULOSIS IN MAN.

Hitherto we have dealt with tuberculosis in its general sense, without reference to the species of the animal in which it is found, or the locality of the body where it is seated. In harmony with the general law of life, the bacillus is varied by the soil in which it grows, and the disease to which it gives rise derives characteristics both as to locality and nature from the physiological idiosyncrasies of the species. For these reasons, and since it is in man that we are *directly* interested, we shall now consider specially *tuberculosis in man*.

* It is impossible to speak separately of the bacilli and their spores. Observations and experiments really refer to the loss or the retention of the property of infectivity.

Putting aside, as of no practical importance, the very rare case of inheritance of the bacillus, man, like other animals, suffers from tuberculosis only when he receives the bacillus from without. Putting also aside, as of no great practical importance from a sanitary aspect, cases which arise from direct inoculation by wounds or through scratches and other ruptures of the integrity of the skin, it may be said that the bacillus always enters by the mouth, that it is either inhaled or swallowed, that it is conveyed either in the air or the food, that it enters either by the lungs or the alimentary canal, or stops short in the structures in and adjacent to the mouth.

Every bacillus and spore thus inhaled or swallowed must have been produced in an animal, not merely derived from or descended from a bacillus or spore produced in an animal, but must itself have passed out from a diseased animal or been included in the flesh derived from a diseased animal.

Tuberculosis in man is therefore caused by infection either (1) through the excretions or discharges from infected animals, including man himself, or (2) the milk of infected animals, including his own species, or (3) the flesh of infected animals.

INFECTION BY SPUTUM AND OTHER DISCHARGES.

There is a remarkable consensus of opinion that persons suffering from phthisis or consumption of the lungs are the largest contributors to the stock of what is very aptly called the "floating infection" which exists in the environs of men. Physicians, bacteriologists, and pathologists, each reasoning on the line of the facts best known to them, concentrate upon this opinion. The hygienist sees no reason to dispute it. Nearly three-fourths of the deaths ascribed to tuberculosis are caused by consumption.* Though the bacillus may reach the lungs by other paths than by the air, still the infection which establishes tuberculosis in the lungs and air passages is generally air-borne. Phthisis is the most frequent cause of phthisis. It is a sufficient cause. Phthisical persons are to be found in every place and in every condition and position in which

* In Glasgow, 1890-94, exactly 73 per cent.

healthy persons are to be found. Everywhere, therefore, tubercle-bacilli may be distributed. For this reason, while all that has been said as to the discharge of bacilli in tuberculosis generally is correct, phthisis has been regarded by all authorities who have taken special steps for the prevention of tuberculosis as either pre-eminently or alone among all its forms demanding precautionary measures. It is necessary, therefore, to enquire exactly how the bacillus is discharged and distributed from a case of phthisis; in what sense phthisis is and in what sense it is not infectious; for a knowledge of the latter is of as much importance as of the former. If we understand how phthisis becomes dangerous, we shall also understand the nature of the risks arising from tuberculosis generally.

The tubercle-bacillus is not "ubiquitous." It haunts the vicinity of the consumptive. It is not in the expired air. It is not in the cutaneous exhalations. It abounds in the sputum. It abounds in the dust of the apartment. It is a well-known physical law that fluid or moist surfaces will not part with solid particles by evaporation or to a current of air. Hence the absence of bacilli in the expired air, and hence they are likewise imprisoned in the sputum. Even particles of sputum sprayed into the air by the violence of coughing, being gross, subside at once, and could only infect if coughed into the face of some one, and mixed with the actually in-going air. In order to be air-borne, the sputum must be dried and broken up into dust. If discharged into a handkerchief, it speedily dries, especially if it is put into the pocket or beneath the pillow. In the last stages of consumption the patient becomes weak, the sputum is expelled imperfectly, pillows, sheets, handkerchiefs are soiled. If a male, the beard or moustache is smeared. Even in the hands of the cleanly, without special precautions, such circumstances all tend to the production around the patient of a halo of infected dust maintained by every process of bedmaking, or of cleaning which includes the pernicious process happily described as "dusting." In the hands of the careless and the dirty, the infectivity is, of

course, greatly aggravated. It attains its maximum of intensity where the filthy habit of spitting on the floor prevails, especially if the floor is carpeted.

The remedy is simply to spit into a spittoon containing a little water; and when a handkerchief must be used, to see that it never dries. Immerse it in water and ultimately boil it. Better still, use a piece of cloth or paper, and burn it at once. Cornet found that where the spittoon was used, and cleanly habits prevailed, there were no bacilli in the dust; where handkerchiefs were used, even though there was no spitting on the floor, there the dust was infective.

This is the golden rule in dealing not only with sputum but with *all* forms of tuberculous discharge, with the *faeces* when they are infected, the pus from tuberculous sores and abscesses, etc. *Keep them moist.* Especially do not allow any soiled linen or dressings to lie about and dry. Make it impossible for the discharges to pass into the condition of dust.

It is not merely the dried substance of the discharge which determines the bulk of the danger. All dust must be regarded as suspicious in the neighborhood of consumptives. If there is any infection at all about, it is there. The ordinary constituents of dust—the fibres of linen and cotton, the shreds of wool—all act as rafts on which the infective germs are borne about, and with which they rise when disturbed.

The infected dust in apartments occupied or frequented without precautions by consumptives will subside indiscriminately upon any exposed surface, and may thus ultimately be swallowed, *e. g.*, upon plates, cups, glasses, basins, etc., viands of all kinds and fluids, such as milk or water. The latter are the most dangerous. They present more or less moist surfaces. No dust which falls on them can be blown away again, nor can they be cleaned.

The first person to suffer from carelessness with reference to sputum is the patient. He breathes an infected atmosphere, and in the struggle which is going on between his tissues and the bacillus, the latter is constantly reinforced, fresh territory is invaded, and the chance of recovery is destroyed.

Auto-infection is one of the unavoidable risks of phthisis. The chances of this occurring ought not to be knowingly increased. The use or misuse of handkerchiefs, and swallowing the sputum, are both likely occasions. These facts bring the precautions necessary in the public interest within the scope of the duties of the private physician in the treatment of a case of phthisis.

INFECTION BY MILK AND FLESH.

The other sources from which man may derive the infecting bacillus are the milk and the flesh of diseased animals. That infection through the stomach is possible, we know from the observed effect upon consumptives of swallowing their sputum, and from experiments with animals. The process of cooking tends to diminish the risk; but in the case of milk, there is no such safeguard interposed, owing to the habit of the country to consume it raw. The primary seat of tuberculosis in children is so frequently in the bowels and their related glands, and milk forms so large and essential an element in the food of children, that we cannot avoid the conclusion that it is to them a frequent source of infection. There is ample room for public interference to prevent the spread of tuberculosis by meat and milk, but, above all, by milk.

THE CONDITIONS WHICH CONTROL INFECTION.

Although without the bacillus there can be no tuberculosis, we cannot call it the sole cause of the infection in the individual case. The theory of infection has a profound influence upon the practical aspects of prevention. So long as we believe that infection is guided from person to person by supernatural agency, without regard to physical laws, we can do nothing. When we advance to the conception that the infecting element is material, and subject to physical laws, we have taken a great stride towards precision, both in preventing and curing the disease. As we ascertain that the element is solid, then that it is organic, we become more precise, until with the knowledge that infection passes with the body of a microbe,

a minute living being, we are ushered into the study of those complicated conditions which surround the maintenance and development of life.

We have already learned something of the restrictions imposed upon the tubercle-bacillus by some of those conditions. It can grow only within warm-blooded animals. It retains *vitality* with considerable tenacity outside the body, especially when dried, but sunlight, free air, and other natural agents, which first kill and then disintegrate, wage steady war against it. In the long run, therefore, only a fraction of the total quantity of infecting material survives until it has the opportunity to infect.

When at last the bacillus reaches its natural habitat, disease is not necessarily caused thereby. In other words, but a small proportion of all who are exposed to infection, who actually inhale or swallow the bacillus, are infected. Every breath we inhale is loaded with particles of all kinds, organic and inorganic, dead or possessing the potency of life. A large proportion of this microscopic dust is caught in the nasal passages in the case of nose-breathers. Tubercle-bacilli have been found in the discharge from the noses of the attendants in wards occupied by consumptives. The moist lining of the air-passages catches the dust which passes the nose. The breath we exhale is optically pure. There are arrangements for expelling such particles—for scavenging the air-passages. If there were not, our windpipes would get choked as surely as unswept chimneys. What may be called local health is more important as a protection from the tubercle-bacillus than any other of the species of disease-germs, especially the integrity and vigor of the organs by which it enters the body. The bacillus is slow to develop, therefore there is a longer interval for its expulsion; but any catarrh, however local, anything which interposes a mechanical obstruction, or weakens the expelling power, or hampers the movements of the lungs, or provides crevices as resting-places, interferes with the expulsion of the bacillus, as of every other sort of foreign matter. In like manner, any impairment of the functions or integrity

of the stomach or bowels favors infection; but inasmuch as the business of the stomach is to resolve and break up, and its acid juice is inimical, while in the bowels there are swarms of competing microbes, and the struggle for life is keen, the bacillus is more likely to perish in these regions. Still, anything of the nature of indigestion or local irritation may give the microbe a chance.

These are all obstacles to entrance within the substance of the tissues, for, as has already been said, the tubercle-bacillus is no more inside the body after it has passed the portal of the mouth than when it is floating in the dust of the air or in the milk of a tuberculous cow. It is nearer, but *there has been no infection*. When it has effected a lodgment in the tissues, the production of disease depends upon the defeat of the antagonistic forces which surround it. These amount to nothing more than constitutional vigor—tissue-health. A condition of perfect health is one of insusceptibility. In this condition the juices of the tissues are poisonous to microbic life, and their cells active agents of destruction. Depression of vital resistance by disease, debauchery, fatigue, want, even by mental causes, induces susceptibility. Susceptibility may be constitutional, and may be so great and so marked as to amount to a predisposition. This it is which passes by inheritance, and, until the discovery of the bacillus, was regarded as hereditary tuberculosis. It is not the disease which is inherited. It is the predisposition—the feeble constitution, the low vitality, the *tout ensemble* of conditions, some of which are recondite and imperfectly understood, some obvious and capable of specification and comprehension. The outcome is a soil so congenial as to accept a delicate infection, from which the majority of mankind emerges absolutely scathless; a soil which sustains and propagates the bacillus so vigorously that to popular observation the disease seems to be inherited. In such a person a blow or a sprain, a cold or sore throat, determines the local incidence. Nothing shows the reality of the antagonistic forces with which healthy animal tissues are endowed more strikingly than the numerous recoveries which take place,

especially from pulmonary infection. In such cases there has been some temporary local susceptibility; but the vital forces have rallied, have invested the detachments of invaders, have cut off their convoys and scouts, and ultimately starved them out. The fact is undoubted. There is nothing in the world to accomplish this result but the native forces of the tissues. The phrase sounds rather mystical and metaphorical; but the forces are real, and may very confidently be trusted as most important allies in any general campaign against tuberculosis.

In such a contest as that which we have depicted, and alike in both stages, the number of bacilli engaged must obviously have an important relation to the result. It is impossible to express oneself without appealing to the analogies of warfare. In the stage of endeavor to obtain a footing, numbers must tell as effectively as in storming a breach; in the stage of maintaining a footing, as effectively as in the resistance of a garrison or the progress of an invasion. This introduces the all-important preventive doctrine of dilution. Infection is fifty times more likely to occur if there are fifty bacilli in each breath of air or pint of milk than if there is but one. Apart, therefore, altogether from the wholesomeness of ventilation and the vital energy imparted thereby, the merely mechanical effect of diluting or reducing the concentration of infective germs in air has an important protective and preventive power.

WHAT OUGHT THE LOCAL AUTHORITIES TO DO ?

IS TUBERCULOSIS AN INFECTIOUS DISEASE ?

Now that we have come to the practical issue of this inquiry, it is well at once to raise the question—Is tuberculosis an “infectious disease”? The answer is—Yes and No. It must be apparent from what precedes that, while in the *academic* sense tuberculosis is infectious, in the popular sense it is not. Even in the language of the schools, where words are weighed and meanings are qualified to a nicety, hydrocephalus, although it is tuberculous, cannot in any sense be said to be

infectious; neither can many forms of tuberculosis of glands, bones, and joints. Until a discharge is established, they cannot be infectious. Indeed, it is doubtful if even those cases of miliary tuberculosis of the lungs which have ended in recovery ever were infectious, and it is certain that no case of phthisis is infectious until the expectoration becomes specific. Tuberculosis, therefore, even in an academic sense, is a disease which, though in all cases caused by infection, is not in all cases infectious. There is no other infectious disease of which this can be said. The fact that it is not infectious in the popular sense is of much more importance for our present purpose. The popular idea of an infectious disease is one from which there is no safety save in keeping away from it. Proclaim a disease to be "infectious," and the people will pay no attention to qualifications. It is very natural—don't go near the person, and the conditions of safety need give no trouble! Education makes no difference. The fear of infection is indiscriminating even to absurdity. Enteric fever, scarlet fever, whooping cough, smallpox, all entail the same social ostracism.

There is a substantial excuse for the popular notion of an infectious disease in the fact that the law does not discriminate between one infectious disease and another. The words have a technical meaning, and every disease in the category is within the scope of every provision of the law applicable to infectious disease—compulsory isolation of the living and of the dead, compulsory disinfection, penalties for the use of public vehicles, for appearance in public places, whether streets or buildings, etc., etc. It may be said that the application of these laws is left to the discretion of authorities, which is true; but one has only to study the opinions advanced by some medical officers of health to be convinced that, before placing tuberculosis officially among "infectious diseases," it is necessary to understand quite definitely what is to follow. There is not a single power of interference with the liberty of persons suffering from smallpox, the application of which to consumptives has not been advocated. Indeed, one cannot avoid

contrasting the studied caution and expressed solicitude to protect the consumptive from prejudice, which characterizes the application by the original German investigators of their discoveries to prevention, with the rash utterances of many of those who seek to interpret those discoveries elsewhere. Koch himself showed the example in the closing words of his famous treatise, "It seems to me the time has now come to adopt prophylactic measures against tuberculosis. But, owing to the wide distribution of the disease, all steps taken against it have to deal with social relations, and it must therefore be carefully considered in what way, and how far, we may proceed without neutralizing, by unavoidable disturbances and other disadvantages, the benefit obtained."

Push aside the proposal to extend such demands to everything that can be designated "tuberculosis" as condemned in the utterance. Consider them as applied to consumption alone. Recall all the representatives of that pale multitude one has known who bore the burden of their infirmity for years, few or many, who did good work in the world, earned honest wages, supported themselves, supported others; all those one has heard of who lived more in the world's eye, who have instructed or entertained mankind, consumptives who have enriched our bookshelves, given us paintings for our walls, and satisfied our ears with music; all the phthisical patients to whom Sir Andrew Clark preached from his favorite text—"Labor vitæ vita est—Work is the life of life," with himself as the example, born of parents who both died of phthisis, and sent to Madeira at twenty-one to die.* They all suffer from an "infectious disease." They are all to be notified by the first physician who sees them. Each is to be "furnished with a card bearing the date of notification," which they are "required to produce on application for disinfectants, etc.," and which medical men, wherever they may have to consult a doctor, are to ask for, so that they may not cause unnecessary expense by being reported again, for economy must not be lost sight of.† The announcement of the sad diagnosis is to be

* "The treatment of Fibroid Lung Disease," a Clinical Lecture.—*Lancet*, 6th January, 1894.

† Dr. Niven "On the Prevention of Phthisis."—*Lancet*, 10th August, 1895.

signalized and proclaimed to the world by a domestic ceremony of purification, conducted by the high priests of the sanitary department, to wipe out all the infection which has followed the unfortunate's pestiferous steps while the taint was yet unrecognized. To put an end to this he must "be thenceforward confined to certain parts of the house," in which the ceremony of purification is to be carried out every two months. They are now known to all men as "consumptive people," and are in future to live up to a code. They must abjure pocket-handkerchiefs; when "attending a workshop, assembly, or church," they must "spit into a hand-glass spittoon," which "may be conveniently attached to the person"; their "eating utensils . . . should be kept separate from all eating utensils of other persons"; their "clothing must be washed separately"; their "bowel discharges should be disinfected."* Even this is a compromise to which the sanitary puritan reconciles himself by the prospect of an ideal such as this: "In the wake of compulsory notification would follow a number of regulations all aiming at stamping out phthisis [surely a misprint for phthisics]. These subsequent regulations fall easily into three classes: (1) Prevention of patients with actual phthisis, or, indeed, with strong hereditary predisposition, from marrying. (2) Prohibition of patients with actual phthisis from frequenting churches, theatres, railway carriages, tram-cars, or any public places. (3) Disinfection of sputa, habitations, and all things coming in contact with phthisical patients. Isolation of the consumptive."†

Let us rapidly run over the various administrative procedures usually applied to infectious diseases, and consider them as applicable to tuberculosis.

* Memorandum of the N. W. Branch of the Society of Medical Officers of Health as to the prevention of phthisis or consumption; also Dr. Niven's Manchester leaflet.

† "The Necessity for placing Tubercular Phthisis under Control."—Article by Arnold Chaplin, M. B., in the *Medical Magazine*, Vol. I., p. 1022. Exactly the same regimen is strenuously advocated in an article in the *Forum* for February, 1894.

COMPULSORY NOTIFICATION ?

Although this has been frequently recommended in expert reports, and was voted by the Parisian Congress in 1888, and again in 1893, as necessary in reference to tuberculosis in general, the fact is chiefly noteworthy as a warning of the direction in which science, without practical discrimination, is moving. This would cover an enlarged cervical gland, a lupus, a white-swelling, a hydrocephalus, a "cold abscess," every form of local tubercle, as well as a case of phthisis. The question has in reality, as a rule, resolved itself into a discussion of the propriety of requiring the notification of consumption. Suffice it to say, that I am not aware of any country or place where this has yet been done. I am not aware of any resolution in favor of compulsory notification having been passed by any body of medical practitioners. On the contrary, the subject has been discussed by the French Academy of Medicine, the College of Physicians of Philadelphia, and the Medical Society of Oldham, with an adverse result. Even the Incorporated Society of Medical Officers of Health of England, when asked to resolve that "tuberculosis should be made a notifiable disease, notifiable under the same acts and under similar conditions to such disease as scarlet fever," passed instead a resolution to the effect that they, "while accepting the view that phthisis is an infective disease, in the prevention of which active hygienic measures should be taken, think it premature to recommend the compulsory notification of a *chronic disease like phthisis*." At the same time a rider was added encouraging voluntary notification and disinfection. *

ISOLATION ?

Here again it may be mentioned the extremists have proposed that sanitary authorities should provide hospital accommodation for tuberculosis, but practically the question is one of providing for consumption. We must carefully distinguish between the humanitarian and the sanitarian aspect of this question. The conditions which determine infection from

* *Public Health*, September, 1893.

phthisis are, as we have seen, very narrow. With proper precautions, they are obviated merely by sleeping alone. In smallpox and typhus they are so wide as to include almost every case; in scarlet fever they are sufficiently wide to make removal to hospital advisable in three fourths of the cases; and in enteric fever in about the same proportion. From the present point of view, the essentially dangerous case of phthisis is the one which is in the last stage, confined to the house or bedridden. When a person in this condition cannot have a bed alone, especially if young children must share it, when the material accessories of the special precautions necessary are wanting, when the conditions are hygienically bad, then removal would, from a preventive aspect, be useful. But this is a task different from any hitherto undertaken by local authorities, and one not to be lightly assumed—to provide, not a hospital for curative purposes, but a shelter for incurables, a “Friedensheim,” or “home of peace,” a place in which to die without endangering the living. Consumption hospitals, in the ordinary sense, are not open to such cases. I confess to considerable sympathy with the opinion of Dr. Squire,* referring to this limited class of cases—“A sanitary district should provide a home for its own advanced consumptives, where the sufferers should be received, without thereby incurring the brand of pauperism; these invalids would thus be prevented from being unwilling dangers to others.” At all events, any provision which exists for the treatment of consumption ought to be patronized by the authorities. These doctrines give them a special interest in consumptives.

DISINFECTION ?

We already, when asked by medical practitioners, wash and disinfect after fatal cases of phthisis, but we seldom are asked.

The circumstances which require precautions in carrying out the washings of consumptives or other persons having tuberculous discharges are restricted very much in comparison with the ordinary infectious diseases. Indeed, we must avoid

* “The Hygienic Prevention of Consumption,” 1893, p. 141.

creating the impression that the bedding and clothing are necessarily infected. It is not so. They seldom are infected. It is the helplessness or carelessness of the patient which leads to infection of his garments, etc. Here again the advanced case, the fatal case, is the dangerous one; so that it would be well that washing and disinfection should, *always after death*, be undertaken by the authorities. If people possess the means of washing properly the clothing of the healthy members of their household, they can also wash the ordinary linen of a consumptive. I see no reason for interference even in the use of a common washing-house. If, however, people have not the requisite accommodation and appliances, if they are untidy and cannot be trusted to carry out any process of washing at all, then it might be carried out by the authorities, each case being considered in view of the circumstances. Whatever danger there is in any case emerges not from mere neighborhood or to mere touching of articles, or from the act of washing, but from the disturbance of dust when they are dry. The moment they are wet the risk is gone.

POPULAR INSTRUCTION ?

In Glasgow, for the last twenty years, the local authority has caused a paper, couched in simple language, entitled "Hints about the Prevention of Scarlet Fever," to be left at every house in which a case is known to exist. While it would be well to take similar means for the instruction of the people regarding tuberculosis, the dissemination of the knowledge of the facts we have been considering through the mass of the public must depend chiefly upon the medical profession. No doubt, every case of consumption will be made the occasion of some detailed instructions as to the nature of the risks entailed upon the family, and the method of obviating them. But there is room and use for popular instructions applicable to the special risks of consumption and of strumous sores. These might be supplied to public dispensaries, and given there to the appropriate patients; and, no doubt, many practitioners would welcome such papers for the more speedy and certain

information of private patients. What ought to be in such pamphlets? We certainly do not wish any exposition of the whole etiology of tuberculosis. We do not wish to call names, and to run the risk of false impressions therefrom. We would meet the occasion of a case of consumption or a case of open tuberculous sores, and state as plainly as might be under what conditions the patients may live in the family, and follow the ordinary intercourses of life, without causing risk to anybody. We would preach the gospel of cleanliness, fresh air, and sunshine, from a new text.

I have already remarked upon the tendency of the disciples of Koch, Cornet, and Heller, especially in this country, to out-Herod Herod in the application of their doctrines. One naturally looks to Cornet himself and to the city where he resides, where, in fact, the bacillus was discovered, and whence nearly all we know of it has been announced to the world, for guidance as to what it is expedient to teach the people as to consumption, and what it is necessary to require of consumptives by way of precaution for the safety of others. Here are (1) a leaflet which Cornet is in the habit of giving to his patients; and (2) a leaflet issued by the municipal authorities of Berlin :—

I.—CORNET.

PROTECTION FROM CONSUMPTION.*

The most destructive disease of the human race is consumption (tuberculosis). It carries off a seventh of the population. In Germany alone there die yearly of consumption well nigh one hundred and fifty thousand people.

It has now been discovered that this disease is caused by the inhalation of a germ, a so-called bacillus. It is infectious, that is, it can be given by any person to another. But neither the breath nor the perspiration of the patient is at all dangerous, as used to be supposed. Infection generally takes place through the spit, and, according to the latest inquiries, especially when the spit is discharged by the consumptive upon the floor or in a handkerchief, where it dries and becomes dust,

* "Ueber Tuberculose," etc., etc., von Dr. Georg Cornet, Leipzig, 1890, p. 145.

and some of the swarm of germs contained therein are inhaled by healthy people.

Many other diseases, such as diphtheria, pneumonia, and various forms of catarrh, may be communicated in a similar way.

Consumptives endanger not only those about them, but themselves, through the drying of their spit, because they again inhale the discharged and dried bacilli, and thus infect hitherto sound parts of their lungs.

Such infection may be avoided if consumptives, and, indeed, all who have a chronic cough with expectoration, keep this expectoration always moist; if they give up spitting on the floor or into a handkerchief, and always use a spittoon which is emptied down the water-closet.

Spittoons must be placed wherever it appears necessary, in every enclosed space frequented by men. They ought not to be filled with sand or sawdust, but either left entirely empty or supplied with a very little water. They ought to be at hand in sufficient numbers in every apartment of houses, in workshops and factories, in counting-houses, schools, offices, public places, in corridors and on stairs, so as to give every one a convenient opportunity of observing these injunctions.

In this way healthy people who have to remain within the same room as consumptives will be almost entirely protected from infection.

Posters ought to be put up in factories, work places, etc., forbidding most strictly spitting upon the floor or into a handkerchief.

On the street, where spitting can scarcely be prevented, certain other circumstances diminish the risk of infection.

Let every man, even though suffering from an ordinary cough, discharge his spit, not on the ground, nor in a pocket-handkerchief, but always in a spittoon.

Milk ought, as far as possible, to be used only after boiling, especially by children, invalids, and convalescents.

By the strict observance of these injunctions, consumptives are made almost harmless to those about them; and all the more that the bacilli can live outside the body only for about six months. It may be hoped that, if these rules are followed out by the sick, consumption in general will diminish.

II.—BERLIN.

MEASURES AGAINST THE SPREAD OF CONSUMPTION.

Pulmonary and laryngeal consumption (tuberculosis) is communicated to the healthy by means of the tubercle-bacilli contained in the expectoration of the sick, when the spit dries, becomes dust, and is thus inhaled. The discharges from the bowels of such persons may in like manner act injuriously.

If those matters are rendered harmless, the spread of consumption is prevented; the healthy are protected from the sick.

In order to prevent drying and the production of dust, the consumptive, indeed *every* person who has a cough (people with a cough are often not aware that they are actually coughing up tubercle-bacilli), ought to spit in vessels containing a little water (spittoons of earthenware or glass). No person ought ever to spit upon the floor or into a pocket-handkerchief. For the reception of sputum, spittoons should be placed in the dwellings of all who are ill with a cough, and, indeed, in all houses, on the stair landings, but especially in such buildings and rooms as are used by the public (hotels, restaurants, places of amusement, meeting places of all kinds, schools, etc.). These spittoons should be eight to ten inches in diameter, two inches in height, with *smooth* slightly inverted edges, made of strong, *smooth* glass, porcelain, earthenware, or enameled iron, containing water to the depth of half an inch or thereby. In place of public resort there should be a clearly legible inscription on the wall "*Spittoon for the use of persons troubled with cough.*" The water must be renewed as it evaporates; the spittoons to be emptied down the water-closet, and washed daily with boiling water.

Cleanliness of all places is the first condition of a successful public health administration; consumptives ought especially to study cleanliness.

The sitting and sleeping rooms of consumptives ought to be provided with washable curtains, table covers, etc., with no carpets on the floors, or woollen runners on the stairs, and contain as little furniture as possible, with washable, easily removable covers (dusters). Elastic iron garden seats, with washable covers or movable cushions, are the most suitable furniture, and facilitate cleaning and disinfection of the room and its contents. Bedmats should be made of washable jute material.

Wipe the *whole* floor of every room over with a damp cloth daily to remove the dust, and even in winter ventilate thor-

oughly for *at least* an hour. The room should be thoroughly cleaned weekly, and every three months be disinfected, according to the directions of the Code of 7th February, 1887, prescribing the process of disinfection in epidemic disease. The fulfilment of these instructions, especially the harmless removal of the expectoration, enables the intercourse of the healthy with consumptives to be carried on without scruple, and prevents the spread of this most destructive disease.

May everybody, according to his circumstances, co-operate to this end.

It is characteristic of all official action in Germany in relation to the person of the consumptive to concentrate attention upon his expectoration. Every detail of injunction, as well as express statement, has the effect of liberating the consumptive from all social disability, so long as he is able to go about, *provided* he is careful to follow the simplest precautions as to expectoration; and when he is weak and bedridden, *provided* his attendants take up the rôle as to expectoration and are cleanly as to his other discharges. It is the same in France. Out of the periodic "Congress for the Study of Tuberculosis," sprang a "League for the Prevention of Pulmonary Phthisis and other forms of Tuberculosis," the primary object of which was to educate the people of France by the circulation of popular literature, each member acting as a distributing center in his own locality. Their first issue was the code of instructions which received such drastic treatment at the hands of the Royal Academy. This was included in a pamphlet of twelve pages, which has been scattered broadcast over France. The code itself is prefaced by some facts to show the gravity of phthisis as a cause of ill health and death, and by an exposition of the modern doctrine, in the course of which this sentence is printed in emphatic type :—

We know further that the consumptive is not in the least dangerous by contact or proximity, that it is neither his body nor his breath which is hurtful, and that we can chat with him for hours, live with him for years, and even sleep in his room and give him the most constant care, without running any serious risk, *provided we take certain precautions*, the chief of which is to collect his expectoration, and **not to delay the** destruction of his spittle until it becomes dry, and is disseminated as dust into the atmosphere.

This position is logical and unassailable. If you accept the doctrine as sound, the practice must be conceded as sufficient. Let there be spittoons handy for everybody; don't put your spit in the way of drying and becoming dust; don't anywhere stir up the dust in inclosed places. The remedy is so commonplace that, after reading all that has been written and spoken, and proclaimed and enjoined, when we look at our notes and find nothing but sputum, spittoons, and dust, we are apt to show a little temper, like Naaman when he expected the prophet to hold a solemn function over his leprosy, and he merely told him to go and wash himself. No doubt, the very simplicity of the prescription will constitute the greatest difficulty in the way of its acceptance and observance. To the vulgar a "spittle" is symbolic of all that is insignificant and contemptible. To base a cardinal matter of sanitary practice and regulation upon the how, and the when, and the where, people are to spit, requires some moral courage. Only a clear apprehension of, and firm belief in, the doctrine that practically consumption is communicable through dried expectoration, and nothing else, will save the practice from ridicule.

How far it is to be explained by the fear of this—how far by the imposition of modern doctrines upon the top of the conception of a vague infection, instead of entirely substituting the one for the other—we cannot say; but the fact remains that in this country the advocates of the modern doctrines never seem to regard the consumptive with any more equanimity. They expound the *modus operandi* of infection; they prescribe spittoons and proscribe dust, just as is done on the continent; but in place of manifesting confidence in the consumptive thus reformed in his habits, as they most expressly do abroad, the tendency here is to exhibit suspicion of him in all his ways. They would surround him with restrictions, and cover him with differential marks, which must make him almost as conspicuous in society as if he were clad in the gray gown and sounded the clapper of a mediæval leper—

"They curse him in eating, they curse him in drinking,
They curse him in coughing, in sneezing, in winking."

The jackdaw of Rheims was not "a penny the worse," but it would be far otherwise with the poor consumptive. Well may one say, "Show us your faith by your works"; but it is not the logical inconsistency, it is the cruelty, the inexpediency of these restrictions which moves our criticism. They are cruel and inexpedient, because unnecessary. They deprive the consumptive of the very advantage of the modern doctrine to which Cornet never tires of adverting, "The consumptive in himself is almost absolutely harmless, and only becomes harmful through bad habits." Setting out from this proposition, he says, prophylaxis is therefore simple. No more demands for legislative prohibition of marriage and other absurdities of restriction, which would consign consumptives to an island in the solitary ocean. No more demands for the separation of children from tuberculous parents, for their accommodation in institutions, for abstinence from kissing them,* for avoidance of intercourse with consumptives, for exclusion of consumptive workmen from workshops, etc. Cornet thinks such prescriptions about the furnishing of rooms for consumptives as those in the Berlin leaflet, and as to special disinfection of sputum are futile for private houses; the hygienist must endeavor to make his demands consistent with the comforts and habits of civilized life, otherwise his voice will be as that of one crying in the wilderness. This is now possible. Prophylaxis had of late come to a standstill because of its impracticable demands. Koch's discovery, the most fruitful in medicine, seemed to exhaust itself in staining bacilli.† In short, Cornet has proved by experimental induction, if ever anything has been proved, that the sputum is practically the only source of infection in phthisis; that where there is no sputum there is no infection; that the sputum is not infectious unless it dries; that it cannot dry excepting under certain conditions, perfectly easy to be avoided; that if these conditions are avoided, a consumptive is not a source of danger to any

* He means kissing on the cheek or brow, which he advises in place of osculation.

† Ueber Tuberculose, etc., 1890, pp. 130, *et seq.* He recurs to the same subject in his paper, "Die Prophylaxis der Tuberculose, etc."—*Berliner klin. Woch.*, May, 1895.

one in the ordinary intercourse of society and the home. If this is so, we must say so; and we must not act, or make others act, as if we did not believe it.

TUBERCULOUS MILK.

There is no need for argument in reference to the milk of tuberculous cows. The facts are so universally accepted and so grave, that the administrative effect shines through them. It is precisely the Glasgow position—that a tuberculous cow must not be retained in a dairy. There is a remarkable consensus of opinion as to the influence of milk in disseminating tuberculosis, especially amongst the young. The pathologist finds “that of the total deaths under ten years of age amongst the mass of the people, about a third are due to tuberculosis,”* and that the usual seat of the disease at that age points to food as the medium of infection. The prevalence of tuberculosis among dairy cows is notorious. Experiment shows that when the udder is affected the milk is virulent. Every authority on the prophylaxis of tuberculosis places the supervision of the milk supply next to the regulation of the expectoration of consumptives in importance. I am inclined to think that it is at least of equivalent importance. It certainly is much more practicable as a matter of sanitary administration. If we remember the habits of the tubercle-bacillus, we cannot imagine a more favorable nurture-ground than the typical byre (cow stable)—a dark or badly lighted space, with insufficient ventilating apertures, which are unhesitatingly closed when necessary to maintain a temperature of 60° to 70° F. by the heat of the animals; the air consequently loaded with carbonic acid, with organic impurities and moisture, full of the dust of dried dung, never penetrated by a direct ray of sunlight, in winter never vacated either in country or town for weeks, and in cities never vacated at all.† The natural result

* “Tuberculosis viewed as an Infectious Disease; its Prevalence and the Frequency of Recovery from it.”—Professor Joseph Coats, *Sanitary Journal*, 23d November, 1891.

† See valuable paper by J. MacMillan, M. B., M. Sc., Edinburgh, “An Investigation into the Condition of the Atmosphere of Cowhouses and Stables in Edinburgh, Leith, and the County of Midlothian.”—*Journal of Comparative Pathology and Therapeutics*, 1892.

is that dairy stock is ravaged with tuberculosis. Yet we never hear a farmer or a dairyman speak of tuberculosis without speaking of compensation. When he puts windows in his byre, and floods it with light, ventilates it, and ceases to use his cow as a heating apparatus, it will be time enough to speak of compensation. Meanwhile the children of the town are being infected wholesale, and it behooves the authorities, not only to take every means to eliminate tuberculous cows from dairy byres, but to enforce sanitary reform in the construction, use, and condition of byres. By-laws as to cubic space, ventilation, lighting, cleanliness, obtain from tuberculosis a direct interest to all men.

But yet more is required. A competent veterinary inspector ought to be at once appointed, who could test with tuberculin the accuracy of the suspicions suggested by his skilled general examination. In this way only can we hope to detect and abolish, as milk-producers, animals which are, no doubt, at this moment contaminating the milk supply of Glasgow. At present our powers are lying dormant. After putting our own house in order, an occasional inspection of the cattle at dairy farms, chosen at random in various parts of the country, would have a most wholesome effect, not limited to the detection of a few unsound animals, but leading up to more stringent by-laws and better sanitation in country byres. County officials require a little help from the powerful commercial lever which the purchaser of country produce can apply whenever he chooses.

THE DWELLING AND CONSUMPTION.

We have already gone with some detail into the relation of local and general health to tuberculosis through their influence on the bacillus. Everything within the control of the individual which promotes and maintains soundness of body; everything within the control of the municipality or the state which improves the physical conditions beyond which the individual living in populous communities cannot go, which raises and maintains the standard of public health, comes within the

scope of the prevention of tuberculosis. So that, to treat this aspect of prevention in its fullness, would be to write a treatise on private regimen and state medicine. Nevertheless, there are some of the elements of health which tuberculosis marks with special importance.

A copious supply of pure air and distribution of direct and diffused sunlight within and without the dwelling are not only wholesome to man, but are directly fatal to the bacilli distributed outside the animal body. Sunlight is the only disinfectant which sustains the man while it kills the microbe. Therefore, whatever withdraws from the air we breathe impurity of smoke, or dust, or foul exhalation, and from the sky above us that canopy of smoke which reduces our sunshine to twilight; everything which promotes free motion of air without and within the house; every by-law which regulates the width of streets, the height of houses, the arrangement of buildings, so as to offer no obstruction to the winds, and to secure as much light and as little shadow in the hours of daylight as possible, which promotes the access of the sun's rays to dwellings, and helps to make the sky visible from the floor of all inhabited rooms, which widens and brightens lobbies and staircases in tenements, which prevents dampness of foundations and walls; every regulation which checks overcrowding both in house and work place, which protects the artificer from irritating dust and fumes and secures to workers of every degree and kind natural light and pure air in the place of their employment,—all are precautions against tuberculosis.

The lungs are like every other organ, their health is promoted by free and full use. Deep inhalation of pure air—especially the open air, the air which is moving freely in the great currents we call winds, which is clarified by sunshine—gives vigor to the lungs, and supplies the heart with well oxygenated blood to be sent throughout the body, increasing the insusceptibility of every tissue. Therefore, every public park, and the flowers and music which attract people thither, every open space and children's playground, every cricket and football field, every gymnasium and drill-ground, is a precaution against consumption.

It is remarkable with what unanimity those who have studied consumption clinically testify that no diseases predispose to it more frequently than enteric fever, scarlet fever, measles and whooping-cough. Enteric fever produces a profound and long-continued depression of the vitality, which favors the lodgment of the bacillus. If, perchance, tuberculous milk should be given to such patients, who are practically sustained for weeks on milk and nothing else, it certainly would infect. Scarlet fever, in its severer forms, also reduces constitutional resistance. On the other hand, measles and whooping-cough create for the bacillus an opportunity chiefly by their influence on local health, producing debility in the lungs, to which whooping-cough frequently adds great general exhaustion. It follows from these facts that all hygienic measures which tend to prevent enteric fever, and whatever is done to limit the spread and prevent the complications of the infectious diseases of children, are precautions against consumption.

In combating tuberculosis in the lower animals, hygienic measures bear an equally important part. Indeed, the tuberculosis of animals is begotten of the domestication of animals by man, and the perversity of man in treating them as if fresh air and sunlight were less essential to their health than to his own. The fact is they are more essential. Tuberculosis prevails among the different species in proportion to the extent to which man has, for his purposes, made them denizens of closed spaces; and most of all in the cow, which he has entirely taken possession of, and which he treats as if foul air and darkness were conditions of its being. Dogs and cats also share in the risks of the society of consumptives who are careless in their habits. The improvement of the hygiene of the domestic animals is a precaution against consumption in man.

SUMMARY OF SUGGESTIONS.

1. It is of supreme importance, first of all, to lay in the mind, both of the profession and the public, a broad foundation of positive knowledge. The direct and indirect practical issues of the doctrine of tuberculosis are very various, and can

only be effectively worked out through the intelligence of the community. They touch the business of administrative bodies of every kind, not merely municipal, but parochial, charitable, corrective, educational, and others both of a public and private character. They affect the personal habits of a considerable proportion of the citizens, and the duties of those about them, and, in certain circumstances, are responsible for them. They concern the health of all.

2. The local authority ought to resolve that, in the interests of public health, it is necessary that washing and disinfection should be effectively carried out after every death from pulmonary consumption, and at the discretion of the medical officers in the course of illness from this or any other form of tuberculous disease.

3. In my own opinion, the importance of taking immediate action in the direction of eliminating tuberculous cows from the dairies, first of all in Glasgow, and next from those sending milk into Glasgow, can scarcely be exaggerated. It is at least equivalent in promise of beneficial results to any part of the special action recommended in this report. Glasgow is in the unusual position of possessing ready to hand the legal powers to deal with this source of tuberculosis. We cannot take full advantage of these powers without a veterinary expert. Science has provided in tuberculin a test which overcomes that difficulty of diagnosis of tuberculous disease in the living animal which has hitherto made professional opinion uncertain or only equivalent to suspicion, and therefore insufficient to support decisive action. This test can be systematically applied only by a specially qualified veterinary surgeon.

4. The issuing of popular leaflets to be systematically distributed from house to house, and otherwise put into the hands of those responsible for the care of the sick, may be remitted to the medical officers to be taken in due course.

5. It is scarcely necessary to point out that many departments of municipal management ought to be inspired with renewed energy, and to receive increased precision of direction.

each in its own special work, from this doctrine of tuberculosis, *e. g.* :—

In the application of general and local powers to the suppression of damp, dark dwelling-houses; to the dissemination of light and air within and around tenements and work places, whether factories, workshops, warehouses, counting-houses, or offices; in the enforcement of ventilation, light and cleanliness in byres; in the provision of open spaces and play places convenient to tenements.

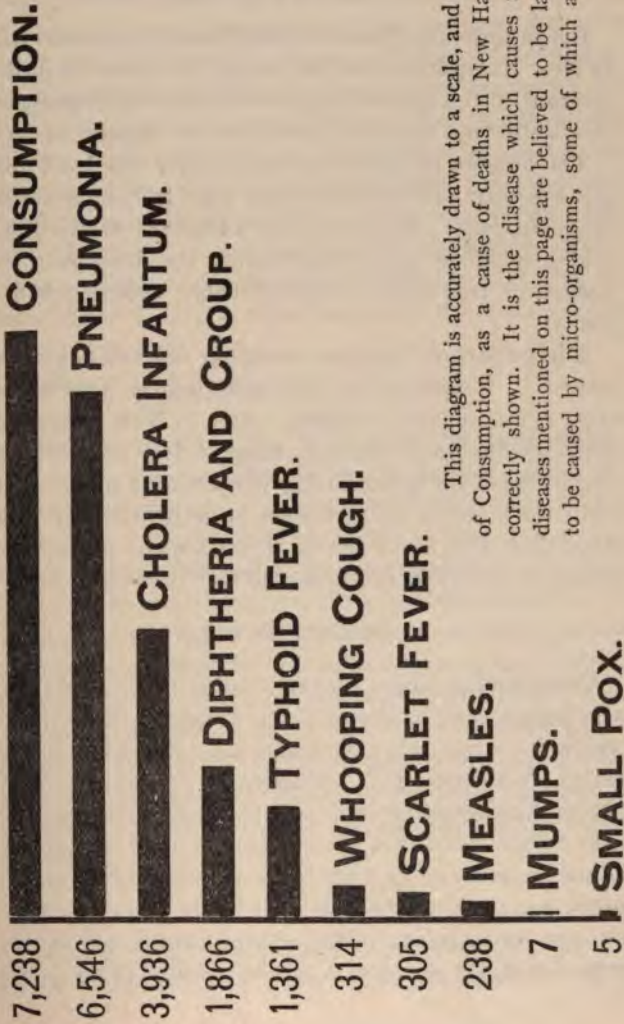
In the suppression of smoke, and the energetic application of the law in all cases relating to overcrowding, cleanliness of the house, and other matters of domestic police, which, if not associated in the judicial mind with some large principle, are apt to sink to the rank of petty details, rather vexatious than otherwise.

Parks are only useful in proportion as they are used, and therefore they must be made attractive. Flowers are wanted for some, music for others, but always space for the young. The youthful instinct to play and sport is accessory to growth and development, and suitable space for the gratification of that instinct may powerfully aid in building up strong, resistant constitutions.

The superintendents of railways, especially of street lines, may find moral courage to enforce their by-laws against spitting "in or upon any car," which, in fact, means to compel the male sex to refrain, for hygienic reasons, from doing that which the female sex, from a sense of propriety, never does.

6. The practical issues of this doctrine of tuberculosis, as regards the individual and the family, in matters which can only be touched by private effort, actuated by the growth of intelligence, are many and various, and must be trusted to the evolution of thought in the process of time. How to deal with *domestic dust* is, perhaps, the most important of these issues. It is to be desired that women should understand the importance of dust in the causation of consumption, and should devise methods of dealing with dust which will end in its collection and destruction, not merely in its disturbance and redistribution. Not merely as housewives, but as sick nurses, women ought to study these modern doctrines.

DEATHS IN NEW HAMPSHIRE 1887-1896. TEN YEARS.



This diagram is accurately drawn to a scale, and the *relative importance* of Consumption, as a cause of deaths in New Hampshire, is, therefore, correctly shown. It is the disease which causes most deaths. All the diseases mentioned on this page are believed to be largely preventable, and to be caused by micro-organisms, some of which are well known.

RESTRICTION AND PREVENTION OF CONSUMPTION.

ISSUED BY THE STATE BOARD OF HEALTH OF NEW HAMPSHIRE.

CONSUMPTION, FATALITY OF.

Consumption is the most fatal disease known to civilization. In New Hampshire it is first among the causes of death. The diagram on the opposite page shows its relative position to the chief infectious and contagious diseases in point of fatality.

The number of deaths returned under this head during the past ten years in New Hampshire was 7,238, an average rate of 723.8 annually. If to this were added the deaths from tuberculosis returned under other terms, the death-rate from this disease in this state would probably exceed 1,000 persons yearly.

A large part of this great mortality can and ought to be prevented. Consumption, although largely preventable, like other communicable diseases, causes in New Hampshire more than one thousand times as many deaths as smallpox, yet a single case of the latter disease will arouse a whole community, while the presence of the former in probably every town in the state, does not cause the least excitement or any concerted action to restrict its insidious and fearful ravages.

CONSUMPTION DEFINED.

Consumption (more properly called tuberculosis), is generally looked upon by the public as a wasting disease, the seat of which is in the lungs, and which in this form is sometimes called "tuberculosis," "phthisis," "phthisis pulmonalis," "tubercular consumption," or "pulmonary consumption." It is as a disease of the lungs best known in all communities, and as such appears in its most frequent and fatal form; but every organ and tissue of the body may be the seat of tubercular disease, as, for instance, in "tubercular meningitis" (acute hydrocephalus of the membrane of the brain), "tabes mesenterica"



of the lymphatic glands of the abdomen, "scrofula," as is commonly seen in the lymphatic glands of the neck, "lupus" of the skin, "white swelling" of the joints, as well as in other tuberculous conditions well known to physicians and surgeons.

CAUSE OF CONSUMPTION.

Consumption is caused by a germ known as the "tubercle bacillus," and without this germ there can be no consumption or other form of tubercular disease. Therefore, to prevent consumption, we must get rid of, or keep out of the way of, this bacillus. This germ is not inherited, but is always contracted from some other case, either human or animal, and with the rarer exception of surface infection, the germ must be inhaled or swallowed in order to produce the disease. It is calculated that about three-fourths of the deaths from tuberculosis are caused by consumption of the lungs, therefore it is evident that the disease is most frequently contracted by the inhalation of the germ.

HOW COMMUNICATED.

The disease is chiefly communicated by the dried sputa of consumptives. This may be readily understood, when it is known that the sputum of a consumptive patient contains thousands, and probably millions, of the germs, and through the perhaps thoughtless habit of expectorating in the public streets, highways, about the premises, or even depositing the sputum in their own apartments in such a way that it becomes dried before being taken care of, the germs are disseminated in the atmosphere. After the sputum has become dried, a current of air, the trailing of skirts, or the act of sweeping sidewalks, stores, halls, factories, private apartments, and in fact, all places where sputa may have been deposited, diffuses the germs through the atmosphere, and thus are created the best possible conditions for infection.

HOW PREVENTED.

It is evident, that the most positive preventive of consumption is the destruction of all tuberculous sputum before it has

becomed dried, or, in other words, before the seeds of the disease can be scattered broadcast. This is necessary for the purpose of protecting, not only the community and the family, but also the patient himself from possible re-infection.

The necessary precautions any tuberculous patient can take with but very little effort, and they will effectually prevent his communicating the disease to others or re-infecting himself. All persons who have a cough, and who expectorate to any extent, should observe the same precautions, even though they may not have been pronounced tuberculous, for it is possible that they may be in the early stages of the disease.

RULES TO BE OBSERVED.

No consumptive should expectorate upon sidewalks, floors of rooms, public halls, railway cars or other vehicles, or in any other place where the sputa, when dried, will be a source of danger. Cuspidores in hotels and other public places, and in rooms occupied or used by consumptives, should always contain a little water, or, better still, a disinfecting solution.*

At home, expectorate into a cup kept for that purpose, in which there is a disinfecting solution; burn contents, and boil cup.

Never expectorate into a pocket handkerchief or cloth which will be allowed to dry. Immerse handkerchiefs in boiling water before storing them with the soiled linen.

For use upon the streets or when away from home, thin Japanese napkins may be provided. After using, they should be folded and burned at the first opportunity.†

Do not spit where domestic animals can have access to this matter. Cattle and fowls are susceptible, and become in turn sources of infection. In fact, do not spit at all where sputum cannot be destroyed before it can dry.

Do not spit on streets, and never swallow the sputum.

No tuberculous person should kiss any one on the mouth.

* For this solution one part of carbolic acid crystals to about five parts of water may be used, or one part corrosive sublimate to one thousand parts of water. The latter solution is odorless, and for that reason is in some instances preferable. Both solutions are poisonous taken internally.

† These napkins can be had at about one dollar per thousand.

Tuberculous patients should be smooth shaven. It is impossible to keep a beard clean and from being infected.

The tuberculous must always sleep alone.

All bed clothing should be changed often, every day when the case is far advanced (no puffs or comforters should be used on the bed), and should be at once immersed in boiling water for five minutes.

Have separate table utensils, and cause them to be scalded as soon as used.

A tuberculous mother must not nurse her baby, nor kiss it on the mouth, and in preparing its food must observe special care.

Tuberculous persons should not engage in occupations where they are compelled to handle food products, as in bakeries, etc.

Be careful not to infect the sleeping berths when traveling.

A FEW DIRECTIONS TO THOSE WHO WOULD AVOID CONTRACTING THE DISEASE.

Remember the sources of infection : Sputum, bowel discharges, and pus from abscesses or tuberculous surfaces.

Avoid resorts devoted to the treatment of the tuberculous.

Summer and winter, women should wear skirts that clear the walks by several inches. Avoid all kinds of fur or other soft trimmings around the lower border of skirts. All the laws that can be enacted, and all the good advice that may be offered, will serve only to diminish, but will not eradicate, this almost universal practice of spitting. Note the filth, especially the sputum on the sidewalks. Skirts dragged through this, are taken home, dried, brushed, and cleaned, and thus infection is introduced into the household.

Do not move into a house where the last occupant was tuberculous, without an effective disinfection of the premises.

Do not share a consumptive's bed, nor use the personal property, including dishes, belonging to one.

GENERAL PREVENTIVE MEASURES.

Under this head are to be included all those conditions and requirements necessary to maintain the highest standard of physical vigor, and almost everything that comes under general sanitation.

Dampness of the soil upon which the house stands and dampness of the immediate locality are to be avoided.

A pure water supply is essential. Water from wells near privies, sink drains, barnyards, etc., should be looked upon with great suspicion at least.

Adequate ventilation should be provided for all almshouses, halls, schoolhouses, and other buildings where people assemble in considerable numbers. Sleeping-rooms should always be well ventilated. Household, as well as personal, cleanliness is always essential.

A wholesome diet, in which the fats, starches, and proteids are harmoniously combined, should be chosen.

Overwork, anxiety, worry, exhaustion, and intemperance should be avoided.

Those who are tuberculously susceptible should select an out-of-door occupation.

THE USE OF MEAT OR MILK FROM SUSPECTED SOURCES.

Tuberculosis is a disease prevalent among cattle, and eminent authorities believe that it can be communicated to man by the products mentioned. Meat from suspected sources should be thoroughly cooked if used at all, and milk, except it be from sources known to be clean and healthful, should be heated nearly to the boiling point, and maintained there for twenty or thirty minutes.

CONSUMPTION NOT HEREDITARY.

Until the discovery of the tubercle bacillus, it was believed by many that consumption was inherited. It is now known that such is not the fact. A family susceptibility, which may in some cases amount to a predisposition to the disease, may and sometimes does exist, but this is the only inheritance in

connection with consumption. A family tendency to contract the disease, is not, however, always an inherited one, but may be due to unsanitary environments, or to any other cause that impairs the vital resistance of the system to disease. But no matter how great may be the susceptibility, the disease will never be developed unless the system is invaded by the bacillus.

NOT AN INCURABLE DISEASE.

Consumption is by no means an incurable disease, although it is perhaps generally so considered by the public. It is a demonstrated fact, that there are very many recoveries, especially when treatment is commenced in the early stages of the disease,—in fact, it is stated by some authorities, that probably out of the total number of persons at some time or other infected with tuberculosis, the majority recover. Whether this statement can be substantiated or not, it is a demonstrated fact that there are a great number of recoveries. Therefore no patient in the early stages of the disease should regard his case as by any means hopeless. The advice of a reliable physician should be early sought and conscientiously followed.

ISOLATION.

It is wholly unnecessary to isolate or to place any social restrictions upon a consumptive patient who will faithfully carry out these reasonable measures to prevent the spread of the disease. Unlike some other diseases, the breath of the patient and the surface evaporations of the body do not carry the germs of the disease. Therefore, if the patient takes the precautions proven to be necessary, there is no occasion for his isolation.

On the other hand, in the case of insane tuberculous patients or persons who willfully violate the reasonable precautions prescribed, there might be a question as to whether isolation might not be justified.

DISINFECTION.

Disinfection should be practised in the case of rooms or apartments which have been occupied by consumptives, or

those in which such persons have died. There is a growing belief, supported by observation, that rooms which have been inhabited by consumptive families may become permanently infected, and ought not to be occupied until radical measures have been taken to cleanse and disinfect them. To secure such disinfection, remove the old paper and wash the walls, floors, and all woodwork with a corrosive sublimate solution. (See foot-note page 34.)

The bed and clothing of the last occupant should be disinfected by steam or by fumigation. Strong soapsuds is also an efficient disinfectant, and may be used for washing floors and woodwork. Walls, ceilings, etc., should be newly papered, whitewashed, or frescoed. The disinfection should be thoroughly performed, but especially so in cases where the habits of the consumptive in regard to the disposal of his sputum have been careless.

NOTE.—In the preparation of the foregoing circular, many American, as well as foreign, authorities have been consulted. Our acknowledgments are due the Medical Society of the State of Washington, and the State Boards of Health of Michigan and Massachusetts.

Copies of this circular may be had gratuitously for distribution, by addressing the State Board of Health, Concord, N. H.

STATEMENTS AND OBSERVATIONS ON SOME OF
THE MORE PROMINENT CAUSES OF DEATH
IN NEW HAMPSHIRE.

CONSUMPTION.

A further consideration of consumption, from the standpoint of its mortality in New Hampshire, will not only reveal many interesting facts, but will also give additional weight to the importance of carefully studying this disease from every point of view.

The number of deaths annually occurring from consumption in this state is appalling in the light of modern sanitary and medical progress, which has revealed beyond controversy the exact cause of the disease and also shown it to be very largely preventable.

The registration of deaths has been for several years so complete that we are able to give very exact figures relative to the prevalence of this and other diseases for at least fourteen years—facts showing the number of deaths annually, the sex, ages by given periods, deaths by months, the period of life in which certain diseases are the most fatal, periods of comparative immunity, and other data essential to a complete understanding of the peculiar features of different diseases.

It may be remarked, incidentally, that the registration reports, containing little but figures, and to the average person almost, if not totally, uninteresting and useless, are, in sanitary work and in the interest of all public health measures, the most important publications we have—in fact they are the actual basis of all our knowledge regarding the prevalence of disease, its increase or diminution, the result of sanitary work, a guide for legislators and health officers, in fine, the basis of all accurate calculations in sanitation. It is through these reports that we are able to show whether or not work along certain lines accomplishes anything in the reduction of

the number of deaths from certain diseases. Take, for instance, consumption, which, by the reports referred to, we are able to demonstrate has been quite materially reduced during the past fourteen years.

PREVALENCE OF CONSUMPTION.

Consumption stands at the head of the list of fatal diseases during the past fourteen years, 1884-1897, inclusive. There are credited directly to this disease 10,466 deaths, chiefly pulmonary tuberculosis, or 747+ annually. These figures do not include deaths from "scrofula," "tabes mesenterica," "hydrocephalus," "tubercular meningitis," "tubercular disease of the joints," "lupus," or other conditions believed or known to be dependent upon the tubercle bacillus; therefore the total number of deaths caused by the germ of consumption is somewhat larger than the figures given in the accompanying tables.

Table No. 1 exhibits the number of deaths annually, the sex of the decedents, the total mortality for the state, and the percentage of deaths from consumption to the total mortality for the years 1884-1897, inclusive. This table is interesting in that it shows that the mortality from this disease is decreasing. Although in the earlier years represented in the table the returns of death were probably somewhat incomplete, it is reasonable to suppose that the relative proportion of deaths from consumption to the total mortality would be approximately correct. Were the fact not recognized that in the earlier years represented in the table the registration was not complete, the figures would indicate that the total mortality of the state has been increasing beyond what would legitimately follow from the increase in the population. This we are confident is not the case. Assuming that what we believe is true, then there should be in the column of totals, in Table No. 1, a larger number of deaths registered from consumption than appears. The figures would then show a considerable diminution in the mortality from this disease, since we know that the returns in recent years have been very nearly, if not quite, correct.

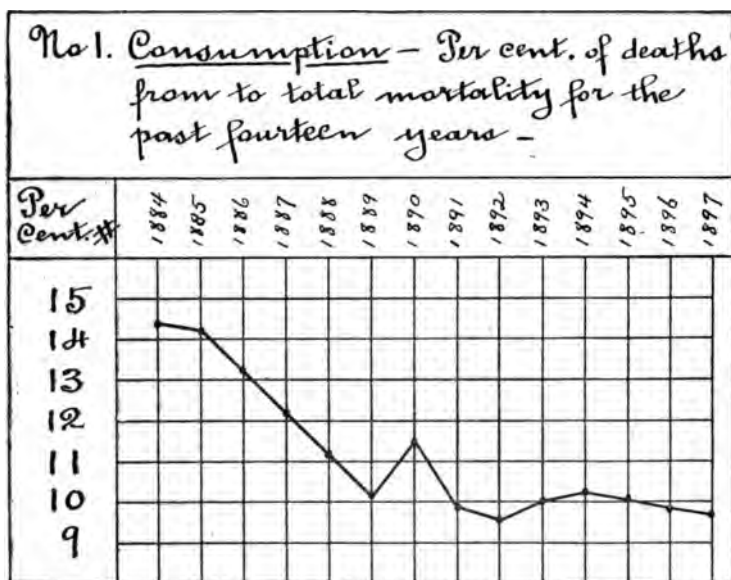
TABLE No. 1.

Showing the number of deaths annually, the total mortality for the state, and the percentage of deaths from consumption to the total mortality, for the years 1884-1897.

YEARS.	Totals.	Males.	Females.	Unknown.	Total mortality for state.†	Percentage to total mortality.
1884.....	868	354	513	1	6,003	14.46
1885.....	857	373	480	4	6,017	14.24
1886.....	809	367	442	....	6,168	13.11
1887.....	763	316	447	....	6,250	12.21
1888.....	742	314	427	1	6,596	11.25
1889.....	651	280	370	1	6,408	10.16
1890.....	825	382	443	....	7,106	11.61
1891.....	695	311	384	....	7,025	9.89
1892.....	736	318	418	....	7,699	9.56
1893.....	737	349	387	1	7,358	10.01
1894.....	714	307	407	....	6,898	10.35
1895.....	693	319	374	....	6,929	10.00
1896.....	679	289	390	....	6,791	9.99
1897.....	697	292	405	....	7,027	9.92
Total.....	10,466	4,751	5,887	*8	.....	.....

* Classed with males. † Not including premature and still births.

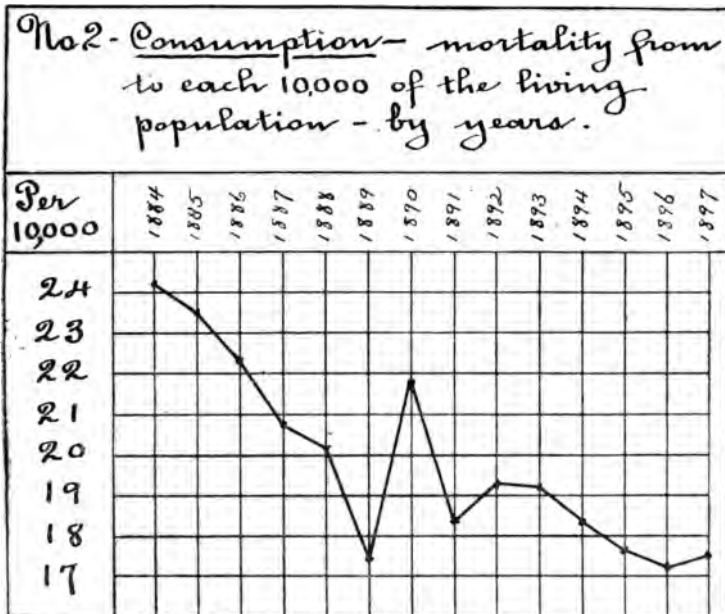
A gratifying view of the decrease in consumption in the past fourteen years is shown in Diagram No. 1. It will be seen that the general tendency of the mortality line is downward, the most noticeable exception being in the year 1890, which upward rise shows the effect of the epidemic of influenza which appeared in that year, and largely increased the number of deaths from consumption. This diagram is based upon the percentage of deaths from consumption to the total mortality in each year represented.



* To total mortality.

As a further corroboration of the assertion that the mortality from consumption in New Hampshire is being reduced, we present Diagram No. 2, which gives the mortality from consumption to each 10,000 of the living population for each year represented. Calculated upon this basis the mortality line is strikingly like that in Diagram No. 1, the sharp rise in 1890, on account of influenza, being well marked.

We have, therefore, figures and calculations from three sources showing a reduction in the number of deaths from consumption: 1st, in the actual number of deaths reported annually; 2nd, in the proportion of deaths to the total mortality, and, 3rd, in the proportion of deaths returned to each 10,000 of the living—all of which prove a very marked and gratifying diminution in the fatality of this disease in this state. There were returned in 1896, six hundred and seventy-nine deaths from consumption, and in 1897, six hundred and ninety-seven deaths, nearly two hundred less than were reported in 1884.



SEX.

Of the 10,466 deaths from this disease returned for the fourteen years given, 4,751 were males, 5,887 females, and 9 with sex not stated. In other words, 43.75 per cent of the decedents were males and 56.25 per cent females. The excess of female over male decedents was 1,136.

This field is an interesting one for those who desire to study or search out the effect of social and individual environment upon the ravages of this disease.

Statistics covering a longer period than are available in our own state, show some interesting facts relative to the mortality from consumption, by sex. In England, for instance, the mortality was greater among females than among males until the year 1866, in which year and from which time the mortality has been less among females than among males, with a ratio constantly widening.

Statistics in Massachusetts from about 1851 to 1862 show a very much greater mortality among females than among males, and from the latter year to 1895 the mortality among females was still in excess of the male decedents, although not so marked as in the former period. In 1895 the female decedents fell below the male mortality for the first time recorded.

In New Hampshire the female mortality has been in excess of the male in each of the fourteen years under consideration.

SEASONS.

Table No. 2 exhibits the number of decedents from consumption, for the years represented, by months. It will be seen by the totals that nothing can be deduced to show that the mortality from this disease is particularly influenced by seasons. The malady is so varied in its duration, from a few weeks to several years, that we cannot see how any definite information can be obtained to show the influence of seasons as a factor in the mortality from consumption, although some observers assert to the contrary and claim to be able to show that both temperature and humidity are marked factors which can be recognized in the causation of pulmonary consumption.

AGES.

Table No. 3 represents the deaths from consumption from 1884-1897, inclusive, by age periods, with totals. Studying the number of deaths given for each age period, it will be seen that by far the greater number of deaths occurred in per-

TABLE No. 2.
Showing the number of deaths from consumption, 1884-1897, by months, with percentages.

YEARS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Unknown.
1884.....	79	61	68	74	101	77	72	51	65	79	68	70	3
1885.....	71	82	87	79	83	96	64	54	54	65	65	55	2
1886.....	78	82	77	81	68	58	62	72	54	64	55	57	1
1887.....	72	63	63	67	82	61	58	60	54	73	52	58	.....
1888.....	66	52	64	55	72	82	61	58	55	52	53	70	2
1889.....	54	63	69	54	45	48	63	56	47	52	48	51	1
1890.....	90	62	81	74	74	72	67	58	56	52	63	75	1
1891.....	69	54	52	66	67	61	60	48	62	52	48	54	2
1892.....	67	69	70	58	64	50	76	57	53	60	66	43	3
1893.....	59	41	62	79	56	54	68	54	67	59	59	79	.....
1894.....	61	48	64	53	64	73	61	73	53	58	59	46	1
1895.....	60	58	70	63	65	49	53	61	50	61	55	43	.....
1896.....	58	68	79	63	60	41	54	53	51	65	40	47	.....
1897.....	53	57	70	64	65	70	62	54	49	62	49	41	1
Total.....	937	860	976	985	966	892	881	809	770	854	780	789	17
Percentage.....	8.95	8.21	9.32	8.93	9.23	8.52	8.41	7.73	7.35	8.16	7.45	7.45	,

CONSUMPTION.

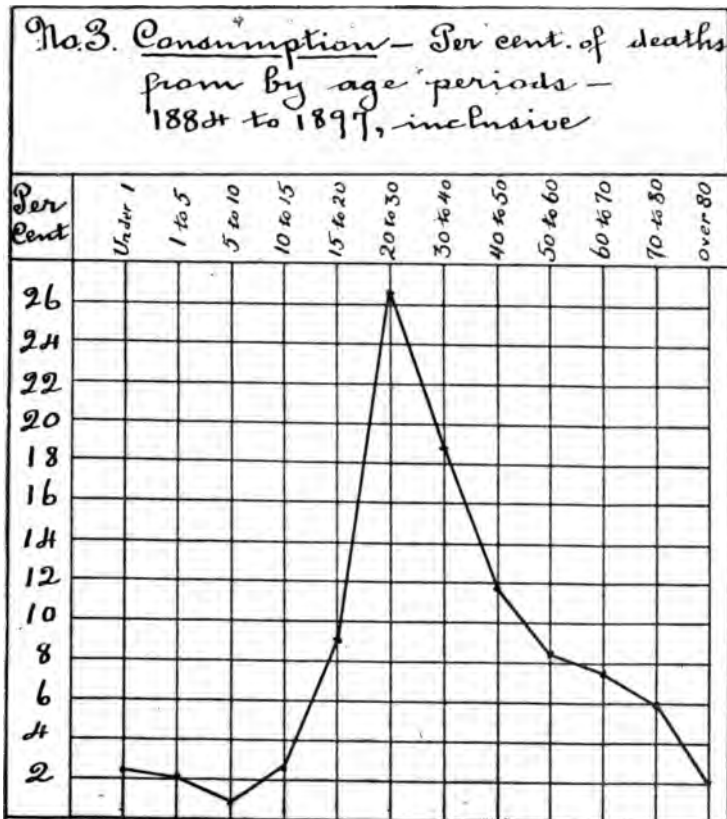
TABLE No. 3.
Showing the number of deaths from consumption, 1884-1897, by age-periods, with totals and percentages.

YEARS.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Unknown.
1884.....	16	12	10	21	94	232	148	96	71	61	64	22	21
1885.....	31	14	4	12	91	218	139	107	76	75	42	19	9
1886.....	13	24	7	11	76	233	162	91	67	74	37	18	6
1887.....	15	12	7	15	73	191	145	101	78	54	46	21	5
1888.....	24	20	4	19	69	219	137	71	62	55	42	15	5
1889.....	14	15	7	22	59	147	120	77	56	65	53	10	6
1890.....	25	17	7	16	61	200	156	113	65	72	63	23	7
1891.....	19	19	9	17	70	174	131	89	67	97	43	10	10
1892.....	14	12	2	22	66	178	150	84	67	71	41	20	9
1893.....	32	11	3	17	54	204	140	91	65	64	35	12	9
1894.....	23	17	11	9	61	200	150	82	59	45	45	8	4
1895.....	14	9	8	15	51	210	129	85	60	49	51	10	2
1896.....	15	17	9	12	69	180	130	85	59	49	37	9	8
1897.....	17	13	6	14	65	225	143	70	46	49	32	12	5
Total.....	272	212	94	222	959	2,811	1,990	1,242	898	820	631	209	106
Percentage....	2.59	2.02	.89	2.12	9.16	26.86	19.01	11.87	8.58	7.88	6.03	1.99	

sons between the ages of 20 and 30, the next highest number being among persons between 30 and 40 years of age, while above and below these age periods the mortality figures diminish quite progressively each way, with the exception that in the age period, 5-10, fewer deaths are recorded than in any other period.

The mortality line by age periods is graphically shown in Diagram No. 3, in which is also given the percentage of deaths from consumption for the fourteen years.

Without a further study of this subject the diagram just referred to would be very misleading, in giving the idea



period, as returned by the census of 1890. We assume that the census of that year fairly represents the average by age periods for the fourteen years considered, inasmuch as the population of New Hampshire is comparatively non-fluctuating, and is changed only by a slow and steady growth, as was shown in the decade from 1880-1890.

Reckoned on this basis it will be seen that actually the greatest percentage of decedents to those living of the same age occurs in children under one year of age, after which age there is a great drop in the percentage, so that the period of life least liable to contract the disease is that included between the ages of one year to fifteen. From 15 to 30 there is a rapid rise, so that between the ages of 20 and 30 the highest point—that is, the greatest liability to the disease in middle life, is reached. From 30 to 60 there is a decrease in the relative danger, while from 60 to 80 there is a marked increase, so that after the first year of life is passed, the greatest liability to death from the disease in a whole lifetime is between the ages of 60 and 80.

These figures are based upon the actual mortality records of over 10,000 deaths occurring in New Hampshire during the past fourteen years, and if the assumption regarding the census is correct, then the diagram represents, absolutely and accurately, the percentages given.

For the mortality from consumption, by towns, cities, and counties, and for general statistical study of the disease, reference should be made to the Registration reports.

TYPHOID FEVER.

During the past fourteen years there have been registered in this state 1,920 deaths from typhoid fever, 1,024 of the decedents being males, and 896 females.

For the two years covered by this report the deaths from typhoid fever were as follows : In 1896, 139 deaths, 84 males, and 55 females; in 1897, 92 deaths, 47 males, and 45 females. In the latter year the number of deaths registered from this disease was less than for any previous year.

TABLE No. 4.

Showing the number of deaths annually, the total mortality for the state, and the percentage of deaths from typhoid fever to the total mortality for the years 1884-1897.

YEARS.	Total.	Males.	Females.	Total mortality.	Percentage.
1884.....	137	63	74	6,003	2.28
1885.....	136	65	71	6,017	2.26
1886.....	194	105	89	6,168	3.14
1887.....	134	68	66	6,250	2.14
1888.....	150	87	63	6,596	2.27
1889.....	161	85	76	6,408	2.51
1890.....	143	76	67	7,106	2.01
1891.....	170	103	67	7,025	2.42
1892.....	109	52	57	7,699	1.42
1893.....	121	60	61	7,358	1.64
1894.....	135	72	63	6,898	1.96
1895.....	99	57	42	6,929	1.43
1896.....	139	84	55	6,791	2.05
1897.....	92	47	45	7,027	1.31
Total.....	1,920	1,024	896	94,275	

Table No. 4 represents the number of deaths in this state, from typhoid fever, from 1884-1897, inclusive, with sex of decedents, the total mortality by years, and the percentage of deaths from typhoid to the total mortality.

TABLE No. 5.
Showing the number of deaths from typhoid fever, 1884-1897, by age periods, with percentages.

YEARS.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Unknown.
1884.....	5	10	7	11	21	34	12	8	7	8	8	3	3
1885.....	2	7	7	11	20	34	14	8	7	10	11	3	2
1886.....	2	6	15	12	33	51	16	12	15	14	16	2	...
1887.....	2	6	1	16	22	41	17	8	7	6	5	2	...
1888.....	3	13	4	11	26	39	12	8	8	9	8	3	6
1889.....	4	5	9	14	26	50	13	14	10	5	6	4	1
1890.....	1	3	10	11	24	33	18	14	10	7	7	3	2
1891.....	1	3	14	12	27	52	17	15	8	9	8	3	1
1892.....	1	6	4	10	17	24	18	8	5	6	3	4	3
1893.....	1	8	3	9	23	29	22	10	5	5	3	1	2
1894.....	...	8	5	6	18	39	19	11	9	10	8	2	...
1895.....	1	2	2	7	19	28	10	12	4	7	3	1	3
1896.....	7	4	7	6	18	47	21	6	6	10	5	1	1
1897.....	1	2	9	4	18	22	12	8	10	4	1	1	...
Total.....	31	83	97	140	312	523	221	142	111	110	92	33	25
Percentage....	1.61	4.32	5.05	7.29	16.25	27.24	11.51	7.39	5.78	5.73	4.79	1.72	...

TYPHOID FEVER BY AGES.

In Table No. 5 will be seen the registration of deaths from typhoid fever by age periods from 1884-1897, inclusive, together with the percentage of deaths, by age-periods, to the total mortality from this disease for the period given. It will be seen that more than one quarter of the actual number of deaths that occurred were of persons between the ages of 20 and 30 years, while the next greatest number were between the ages of 15 and 20. In these two periods

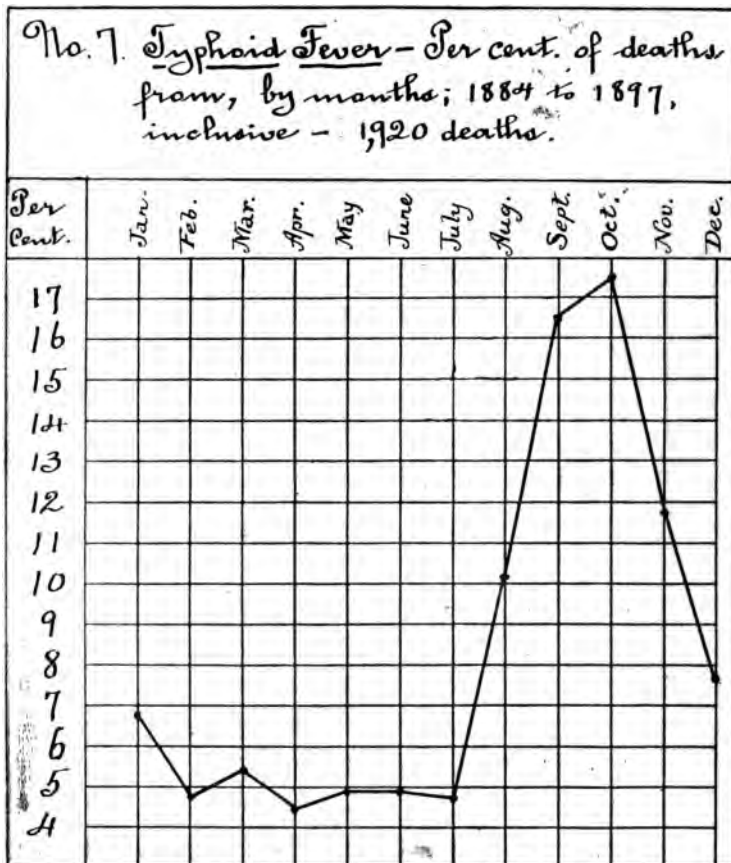


TABLE No. 6.
Showing the number of deaths from typhoid fever, 1884-1897, by months, with totals and percentages.

YEARS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Unknown.
1884	8	6	6	9	4	2	5	18	22	31	17	10	2
1885	8	8	12	7	11	12	2	9	28	16	12	11	...
1886	8	11	9	9	5	12	10	26	26	44	22	12	...
1887	5	5	7	8	7	2	4	19	32	22	14	9	...
1888	9	7	6	7	6	11	6	18	22	21	18	18	1
1889	10	6	8	7	6	7	12	15	20	35	22	13	...
1890	20	12	10	6	8	3	9	9	27	19	12	8	...
1891	12	7	7	4	8	4	4	19	22	31	35	17	...
1892	8	4	5	2	9	4	7	7	16	19	16	12	...
1893	6	4	11	4	9	6	10	14	17	21	13	6	...
1894	12	4	6	5	10	6	7	12	23	30	14	6	...
1895	6	2	3	4	4	7	.....	11	25	18	11	8	...
1896	12	14	8	9	6	12	9	9	20	17	10	12	1
1897	7	3	6	8	2	7	8	7	16	12	8	8	...
Total	131	93	104	86	95	95	93	193	316	336	224	150	4
Percentage.	6.82	4.84	5.42	4.48	4.94	4.94	4.84	10.05	16.46	17.50	11.66	7.81	...

TYPHOID FEVER.

more deaths occurred from typhoid than in any other of the age periods given. It is also true that the percentage of deaths from typhoid to the living population of those periods was greatest in these two periods, but they are reversed.

A glance at Diagram No. 6 shows the percentage of deaths from typhoid fever, by age periods, to the living population of the same period. This diagram accurately illustrates the liability line of the disease. The period of life most susceptible to this disease is included in the age period, 15-20, and the next most susceptible period is 20-30. After thirty the drop in the line of mortality is very marked, and from forty to sixty still diminishes, after which period of life it ascends to quite a marked degree, as will be seen by studying the diagram.

SEASONS.

Table No. 6 shows the deaths from typhoid fever, by months, for the fourteen years given. A study of these figures, especially in connection with Diagram No. 7, shows very emphatically the great increase in this disease during the autumnal months of the year. It was formerly believed, even by experienced physicians, that typhoid fever never prevailed in the winter months, a theory which, since the registration of vital statistics has been required, has been disproved.

The following, relating to the restriction and prevention of typhoid fever, was issued as a circular during the year, and has been quite extensively distributed among local boards of health:

THE PREVENTION OF TYPHOID FEVER,
SOMETIMES CALLED "ENTERIC FEVER," "GASTRIC FEVER,"
"PYTHOGENIC FEVER," "CESSPOOL FEVER," ETC.

Typhoid fever is one of the preventable diseases, and sanitarians and physicians very generally agree that there is no excuse for its existence in any community. This opinion is based upon the fact that intelligent and well-directed efforts to restrict the disease are attended with most successful results, thereby proving that the laws through which it operates are well understood by those who have studied the subject and that the disease is capable of being controlled by proper measures.

On an average, about 150 deaths are annually reported in this state as having occurred from typhoid fever. This mortality represents from 1,200 to 1,500 cases of the disease annually. A large proportion of this mortality can and ought to be prevented.

The greatest number of deaths from this disease is of persons in the prime of life, and this should prompt to greater efforts for the prevention of the disease. Persons of all ages are liable to it, and although they may have it in a mild form in many instances, yet they may be the medium of communicating the disease in a fatal form to others. Although it is not one of the most contagious diseases, *it is communicable to others.*

It is not considered directly transmittible from the sick to the well, but the patient eliminates from his person, chiefly through the excreta, the germ which produces the disease. The germ will soon perish if not placed under conditions favorable to its development; but any mass of decomposing organic matter, such as cesspools, filthy drains, damp and unclean cellars or rooms, etc., and filth in any form, affords a fertile soil for the reproduction of the typhoid fever germ. Hence it follows that privy-vaults, cesspools, filthy drains, etc,

become centers of contagion, and dangerous localities when typhoid fever is prevalent. The danger from them is vastly increased, because the fluid portion of their contents, charged with the germs of disease, permeates the soil and is often carried by underground water currents to neighboring wells, which in this way become poisoned. If there is any weight in the testimony of close observers and careful investigators, then the evidence is overwhelming that typhoid fever is a filth disease. So general is the belief that filth in some form is necessary to support this disease, that its very name suggests uncleanness, defective sewerage, bad drainage, foul vaults and cellars, filthy sink-drains, contaminated drinking water, etc., etc.

The poison of typhoid fever may possibly sometimes be inhaled into the system, but in the great majority of cases the disease germ undoubtedly finds its way into the intestinal canal by means of the food and drink. Reflection will show, and experience teaches, that there are many ways in which our food and drink may become contaminated with the germs. Some of the most frequent ways are these: The discharges are thrown into the privy or upon the ground, whence they soak, sometimes long distances, through the soil into the family well. The soiled clothes of the patient are washed, and the water carried by a loose and leaky drain which runs too near the well. Some kinds of food and drink are very absorptive of disease germs, and being kept too near the patient, become contaminated. Cases are known where milkmen, with fever at their own homes, have caused serious outbreaks of the disease among their customers, by keeping the milk, before it was distributed, too near the sick, by diluting it with contaminated water, or even rinsing the cans with such water.

PREVENTION.

1. Keep your premises at all times in a good sanitary condition. Filth is the *nidus* in which the cause, or germ, of the disease may be developed. Of all forms of filth none

others are so dangerous to our homes as the "hole-in-the-ground" privy, and the sink-drain. The former should never be tolerated, nor the latter, either, in its usual forms.

Filth, in its sanitary signification, includes not only the grosser forms, but also the less tangible and more *respectable* kinds which are often ignored. The impalpable but not inodorous air of unventilated bedrooms is disgusting and dangerous; the sewer-air which leaks from faulty water-closets or defective drainpipes in the homes of the wealthy consigns many to the tomb; the emanations from rotting chips or sawdust, the exhalations from decaying vegetables in the cellar—all these may dangerously pollute the air, and should be avoided.

2. All discharges from the fever patient should be received in a vessel containing a pint or more of Solution No. 1 (see page 61), and kept covered by the disinfectant three or four hours, and then buried in the earth where they cannot by any possibility find their way into wells, springs, or brooks. *They should never be allowed to mingle with any kind of filth, in a privy or elsewhere.*

The clothing, both of bed and patient, should be disinfected by dropping it into a tub containing several gallons of Solution No. 2 (see page 61), and should be kept therein until it can be boiled. After death or recovery disinfect the room by sulphur fumigation (see page 62), followed with washing the floors and other woodwork with Solution No. 1, or No. 2.

3. As far as concerns the personal hygiene of nurses and attendants, it may be said that, if the foregoing preventive measures are carefully carried out, there is hardly a possibility of their taking the disease; in fact, under such conditions, cases in which the attendants have taken the disease from the patient are almost if not quite unknown. Typhoid fever goes through families because all have been exposed to the disease-producing cause; or the first cases contaminate the water supply, or "seed down" the privy vault and the house surroundings with the disease germs.

Nurses and others in the family should eat nothing in the room where the patient is, nor anything which has been there.

The food for the attendants and family should be prepared and kept as far from the sick as possible. Thorough boiling will kill all disease germs; so, while the fever is in the house, it is safer to boil all water and milk just before it is used.

Bodies of those dead from typhoid fever should be wrapped in a cloth wet with either Solution No. 1 or Solution No. 2, and at once buried.

The room in which there has been a case of typhoid fever, whether fatal or not, should, with all its contents, be thoroughly disinfected by exposure for twenty-four hours to strong fumes of burning sulphur immediately after it has ceased to be occupied by the patient, and then it should for several hours, if possible for days, be exposed to currents of fresh air.

Upon the discovery of a case of typhoid fever by the attending physician, he should immediately notify the local board of health and should co-operate with the board to restrict the disease. Upon receiving such notice the local board of health should :

1. Give public notice of infected places, so that no person may unguardedly drink water or take food from a source likely to be contaminated, or unduly expose themselves to the disease.
2. Investigate the probable source and mode of origin of the disease. If probably from a contaminated well or general water supply, see that measures are taken by stopping its use, by boiling it, or otherwise, to prevent further cases being caused in the same manner. If connected with the sewer, see that the plumbing is in good order and all fixtures properly trapped.
3. Order and enforce the disinfection of all discharges from the bowels of patients sick with typhoid fever. It is safest that the discharges of all persons who have diarrhea shall be disinfected.*
4. Disinfect the contents of the privy on the premises, or any other that has been used by the patient.†

* For this purpose use disinfectant No. 1 freely.

† To keep a privy vault disinfected during the progress of an epidemic, sprinkle chloride of lime freely over the surface of its contents daily, or use a quart of Solution No. 1 daily.

5. Order and secure the disinfection of all articles of clothing or bedding that have been soiled by discharges from the patient.

6. Secure the co-operation of the people in the prevention of this disease, by teaching them its modes of spreading, the best methods for its prevention, and the greater importance of efforts for its prevention in times of drought and low water in wells.*

7. See that the premises are properly disinfected after the death or recovery of the patient.

DISINFECTANTS.

SOLUTION NO. 1.†

Chloride of lime (bleaching powder)	.	.	one pound.
Water	.	.	four gallons.
Mix.			

All clothing or bedding soiled by the patient's discharges must be removed *at once, and placed in boiling water, to be boiled for half an hour*; or they may be immersed in the following solution, allowing them to remain for two hours, when they may be wrung out and sent to the laundry, to be thoroughly boiled :

SOLUTION NO. 2.

Sulphate of zinc	.	.	.	.	.	one pound.
Common salt	.	.	.	.	.	one half pound.
Water	.	.	.	.	.	four gallons.
Mix.						

Nurses and attendants should observe perfect cleanliness, and their hands should be frequently bathed in Solution No. 2.

* Wells are more dangerous at times of low water, because the area of drainage to the well is greatest when the water is the lowest.

† For a free and general use in privy-vaults, sewers, sink-drains, refuse heaps, stables, and wherever else the odor of the disinfectant is not objectionable, this is one of the cheapest and most effective disinfectants and germicides available for general use.

Chloride of lime ought to be obtained anywhere for ten cents a pound; in some places it can be obtained for five cents a pound.

This is one of the best disinfectants known.

FUMIGATION WITH SULPHUR

Has ever been regarded as a reliable method of disinfecting a house, and should be resorted to after a case of smallpox, diphtheria, scarlet fever, or typhoid fever, and in such other cases as the attending physician may think best. To do this, the house must be vacated. Heavy clothing, blankets, bedding, and other articles which cannot be treated with solutions, should be opened and exposed during fumigation, as follows: Close the room as tightly as possible, place the sulphur in iron pans supported by bricks placed in wash-tubs containing a little water, set it on fire by hot coals, or with the aid of a spoonful of alcohol, and allow the room to remain closed for twenty-four hours. For a room about ten feet square, at least three pounds of sulphur should be used; for larger rooms, proportionally larger quantities. Heavy woolen clothing, silks, furs, stuffed bed covers, beds and other woolen articles, which cannot be treated with disinfectants, should be hung in the room during fumigation, their surfaces thoroughly exposed, and their pockets turned inside out. Afterward they should be hung in the open air, beaten and shaken. Pillows, beds, stuffed mattresses, upholstered furniture, etc., should be cut open, and their contents spread out and thoroughly fumigated. Carpets are best fumigated on the floor, but they should afterward be removed to the open air and thoroughly beaten.

REMARKS.

Disinfection, following every infectious or contagious disease, should be carried out under the supervision of the local board of health, or by some competent person authorized by the board. Much of the so-called disinfection practiced by many families is wholly inefficient and useless. The odor of burning coffee, tar, sulphur, or any other substance in the sick room, or other part of the house or premises, in the presence of the patient, or other persons, operates only as a deodorizer, and

does not destroy the germs of the disease. This is an important fact that every family should understand.

NOTE.—This document is published by the State Board of Health for gratuitous distribution throughout the state. A copy may be obtained by applying to the board, Concord, N. H.

Local boards of health and physicians are requested to obtain and distribute copies of this circular in localities where the disease makes its appearance. Copies will be furnished for this purpose upon application.

In order that this document may do the greatest possible good, it is hoped that each one who receives it will not only make such use of it as will tend to disseminate most widely the suggestions and statements of fact contained therein, but will also act for the restriction and prevention of this disease in accordance with its suggestions, and by other effective methods and measures.

DIPHThERIA AND CROUP.

Although it has been demonstrated that diphtheria and croup are one and the same disease, the distinction is still maintained in the mortality returns, hence they are tabulated separately in the same table for the purpose of showing under what terms this cause of death is returned, and also because it has been the custom to make the distinction herewith given. It is known, however, that membranous croup is laryngeal diphtheria, and there is no occasion, from a sanitary standpoint, to make two classifications for the same disease.

Diphtheria is a communicable disease, against the infection of which every possible precaution should be taken, especially among children. For the year 1897, 143 deaths were reported in this state from diphtheria and croup, 82 from the former, and 61 from the latter disease; in other words, there were 143 deaths from diphtheria in New Hampshire during the year mentioned. The average number of deaths from this disease for the past fourteen years was 181 annually, the total number of deaths from the disease for the period named being 2,540. The smallest number of deaths returned in any year of the period given was in 1893, when there were reported 99 deaths.

A glance at the table will show that the mortality from diphtheria for the past five years has been considerable less than for the preceding five years. We believe that the mortality should be reduced below the smallest figures given, and

TABLE No. 7.

Mortality from Diphtheria and Croup from 1884 to 1897, inclusive.

YEARS.	DEATHS.			PERCENTAGES OF DEATHS TO DEATHS FROM ALL CAUSES.			DEATH RATES PER 10,000 LIVING.		
	Croup.	Diphtheria.	Total.	Croup.	Diphtheria.	Total.	Croup.	Diphtheria.	Total.
1884.....	49	110	159	.79	1.77	2.56	1.36	3.06	4.42
1885.....	74	78	152	1.19	1.25	2.44	2.04	2.15	4.19
1886.....	64	156	220	.99	2.41	3.40	1.75	4.27	6.02
1887.....	84	177	261	1.29	2.73	4.02	2.28	4.81	7.09
1888.....	94	103	197	1.37	1.50	2.87	2.53	2.77	5.30
1889.....	88	210	298	1.31	3.13	4.44	2.35	5.61	7.96
1890.....	64	164	228	.86	2.21	3.08	1.69	4.32	6.02
1891.....	56	160	216	.79	2.20	2.10	1.48	4.22	5.69
1892.....	45	134	179	.56	1.69	2.25	1.18	3.50	4.68
1893.....	36	63	99	.47	.82	1.29	.93	1.63	2.57
1894.....	44	73	117	.64	1.05	1.69	1.13	1.88	3.01
1895.....	49	78	127	.71	1.12	1.83	1.25	1.99	3.25
1896.....	59	85	144	.87	1.25	2.12	1.49	2.16	3.65
1897.....	61	82	143	.87	1.17	2.04	1.53	2.06	3.59
Total..	867	1,673	2,540	.....	.....	.....	.....	.....	.....
Average	62	119	181	.91	1.73	2.54	1.63	3.17	4.80

that this might be accomplished through a careful diagnosis, based upon bacterial examination, in each case, a strict isolation of those infected, and prompt treatment with antitoxin.

Table No. 7 gives the number of deaths from diphtheria and croup, percentage of deaths to deaths from all causes, and the death rate per 10,000 of the living population for the fourteen years, 1884-1897, inclusive.

DIPHTHERIA BY AGES.

Diphtheria is essentially a disease of childhood and early life, although no age is exempt from it.

Table No. 8 gives the deaths from diphtheria by age periods, for the past fourteen years. It will be seen that over 45 per cent of the deaths occurred in children between the ages of 1 and 5 years; that over 26 per cent were in the age period, 5-10; that over 10 per cent were in children under one year of age; that over 8 per cent occurred in children between the ages of 10 to 15; and that after the latter age the number of deaths, by age periods, rapidly diminishes to a very small percentage.

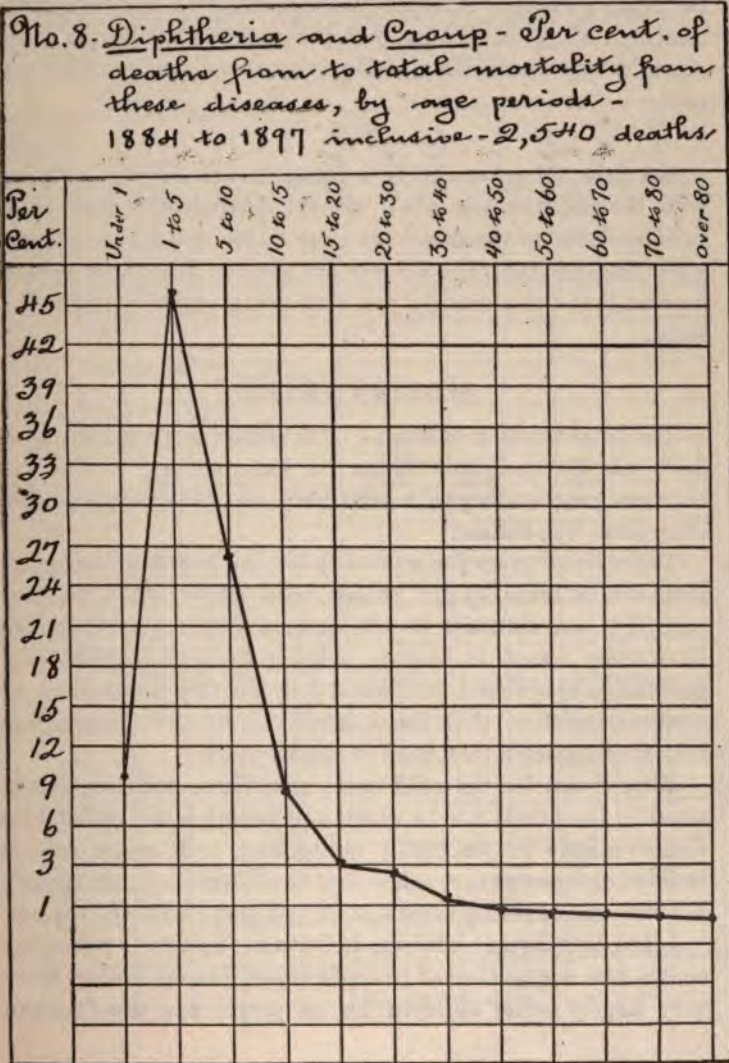
These facts are graphically represented in Diagram No. 8, the very marked and conspicuous lesson of which is, that diphtheria is a disease chiefly of childhood. The diagram suggests another point, the most important of all, which is that if children can be carried by this disease, or, in other words, protected from it, the danger of contracting it in after life, or, at least, of its terminating fatally, is exceedingly small. To this argument the objection cannot be made that is inconsiderately and erroneously maintained by some in connection with scarlet fever and measles, to wit, that the reason why a greater mortality from these diseases does not occur in later life, is because so many persons have them in childhood, and are thereby protected. This specious argument does not hold in any of these diseases, and must be totally untrue in diphtheria, inasmuch as the individual is not protected from subsequent attacks by reason of having had the disease.

TABLE No. 8.
Diphtheria and croup, deaths from, by age periods, from 1884-1897, inclusive.

YEARS.	WHOLE NUMBER.			AGES.													
	Totals.	Males.	Females.	Unknown.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Unknown.
1884.....	159	72	87	16	74	40	17	4	2	.....	1	3	.....	.....	.....	1	1
1885.....	152	79	72	30	73	31	5	3	2	.....	1	2	.....	.....	.....	.....	.....
1886.....	220	106	114	22	93	68	23	7	3	1	1	2	.....	.....	.....	.....	.....
1887.....	261	127	133	33	132	58	22	9	9	4	1	2	1	1	2	.....	1
1888.....	197	96	101	22	110	45	7	4	2	2	2	1	2	1	1	.....	.....
1889.....	298	139	157	2	151	79	20	13	10	3	3	3	.....	.....	.....	.....	1
1890.....	228	109	117	22	105	51	27	10	3	4	4	3	.....	.....	.....	1	2
1891.....	216	122	93	11	37	84	50	17	7	2	2	4	.....	.....	.....	.....	3
1892.....	179	99	80	15	85	43	15	6	3	1	2	2	.....	.....	.....	.....	.....
1893.....	99	44	55	14	39	29	11	1	2	2	1	1	.....	.....	.....	.....	.....
1894.....	117	58	59	20	57	28	6	.....	.....	2	2	1	.....	.....	.....	1	.....
1895.....	127	62	65	10	65	33	6	3	4	4	1	1	.....	.....	1	.....	2
1896.....	144	52	92	17	73	35	10	2	2	4	2	.....	1	.....	.....	.....	.....
1897.....	143	75	68	11	77	42	6	1	2	2	2	1	.....	1	.....	.....	.....
Total....	2,540	1,240	1,293	*7	261	666	225	77	62	28	22	12	5	5	3	13	.....
Per cent.	.....	49.09	50.91	..	10.27	26.22	8.86	3.03	2.44	1.10	.86	.47	.19	.19	.11	.....	.....

* Classified with males.

In connection with the subject of deaths among children from the infectious and contagious diseases, a glance at the diagram just mentioned, No. 8, in connection with similar diagrams on scarlet fever and measles will be exceedingly interesting.



SEASONS.

The mortality from diphtheria is greatest during the colder months of the year, the highest mortality for the fourteen years mentioned being in October, 12.32 per cent; in November, 11.61 per cent; December, 11.34 per cent; January, 10.19 per cent; February, 8.78 per cent; March, 8.11 per cent; September, 7.52 per cent; May, 6.65 per cent, June, 6.26 per cent; April, 6.14 per cent; July, 5.63 per cent, and August, 4.88 per cent.

SEX.

Sex does not appear to be a factor in this disease, judging from the statistics presented. Of the 2,540 deaths, from 1884 to 1897, 1,240 of the decedents were males, and 1,293 females, while in seven cases the sex was not given. It will, therefore, be seen that the mortality was very nearly equal between the sexes.

SCARLET FEVER.

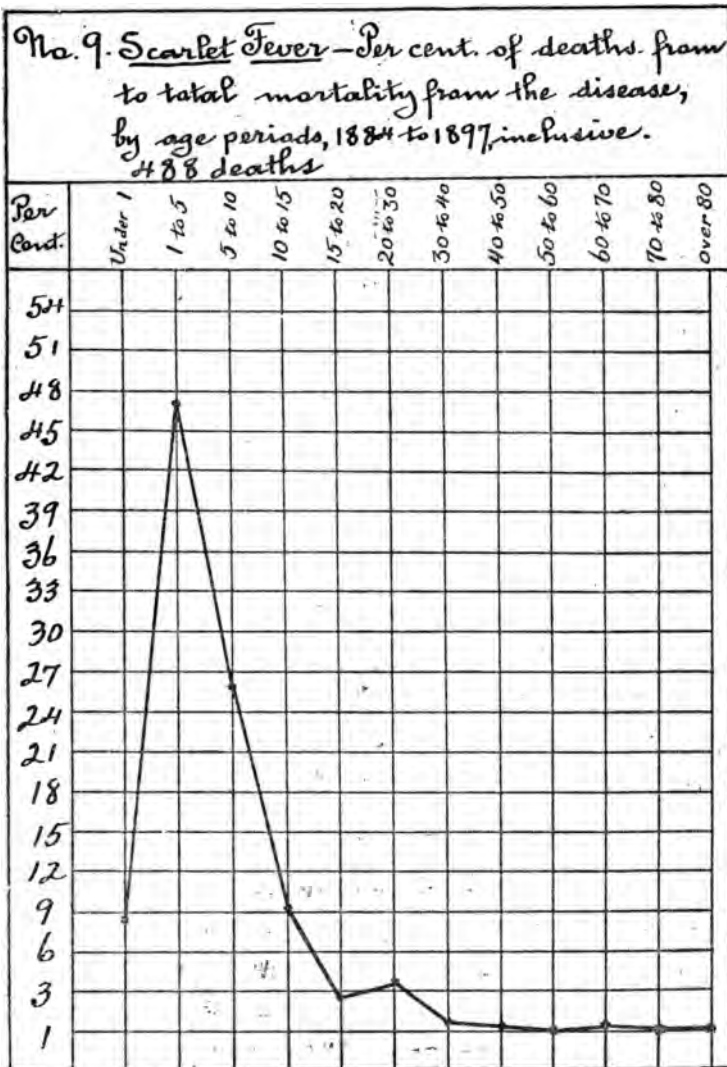
The total number of deaths from scarlet fever for the year 1897 was 34, as against 23 for the previous year. For the fourteen years ending with 1897 there were 488 deaths in this state from this disease.

Table No. 9 gives the mortality for the past fourteen years from scarlet fever, by age periods, with totals. It is unfortunate that our statistics do not cover a longer period, for we have every reason to believe, judging from the reports of a generation ago, found in medical journals and transactions of medical societies, that the mortality from this disease was very much greater then than in recent years.

Were it not for the mild cases, sometimes not even recognized by the family and to which a physician is not called, this disease might be practically obliterated. A severe case is isolated and proper care taken that the infection is not spread; but the mild, walking cases scatter and perpetuate the disease.

Like diphtheria, cholera infantum, measles, whooping cough, and some other of the infectious diseases, scarlet fever very largely seizes children for its prey. For the fourteen

years given, over 46 per cent of all the deaths from scarlet fever were in children between the ages of one and five; over 26 per cent from five to ten; 9 per cent from ten to fifteen, and over 8 per cent under one year of age.



STATE BOARD OF HEALTH.

TABLE No. 9.
Scarlet fever, deaths from, by age periods, from 1884 to 1897, inclusive.

YEARS.	WHOLE NUMBER.				AGES.												
	Totals.	Males.	Females.	Unknown.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Unknown.
1884.....	52	26	26	....	7	20	12	8	1	4	....	....	....	....	....	....	....
1885.....	53	22	31	....	5	30	11	4	1	1	1	....	....	....	....	....	....
1886.....	21	11	10	....	1	8	9	1	....	1	....	....	....	....	....	....	....
1887.....	26	11	15	....	5	10	3	6	....	2	....	....	....	....	....	....	....
1888.....	34	18	16	....	5	16	5	8	2	....	1	1	....	1	....	....	....
1889.....	18	9	12	....	4	7	3	2	1	....	....	....	....	....	....	....	....
1890.....	16	8	8	....	2	10	1	1	....	2	....	....	....	....	....	....	....
1891.....	13	6	7	....	1	7	4	1	....	....	....	....	....	....	....	....	....
1892.....	27	14	13	....	2	12	10	2	....	1	....	....	....	....	....	....	....
1893.....	52	31	21	....	2	25	16	1	1	4	1	1	....	....	....	....	....
1894.....	61	29	32	....	3	27	22	5	4	....	....	....	....	....	....	....	....
1895.....	58	21	37	....	3	30	13	4	2	4	2	....	....	....	....	....	....
1896.....	23	7	16	....	....	11	6	4	....	1	1	....	....	....	....	....	....
1897.....	34	12	22	....	1	15	14	3	....	....	....	....	....	....	....	....	....
Total ...	488	222	266	....	41	228	129	45	12	20	6	2	....	1	....	....	....
Per cent. ....	.....	45.49	54.51	....	8.40	46.72	26.43	9.22	2.46	4.09	1.22	.41	....	.20	....	....	....

A glance at Diagram No. 9 shows vividly the age period, with percentage of deaths for each period, and emphasizes most emphatically that this is a disease almost wholly of childhood. It suggests the importance of protecting children against the infection of the disease by every means possible, particularly as the liability to contract it later in life is very slight.

MORTALITY BY SEASONS.

For the fourteen years ending with 1897, the largest number of deaths from scarlet fever reported for one month was in May, while the smallest number was in August. A general survey of the mortality by seasons shows that the death rate from this disease is somewhat greater in the colder months of the year, but in this respect is not very marked.

MEASLES.

During the past fourteen years there have been reported 316 deaths from measles. For the year 1897, 12 deaths were returned from this disease, a number considerably less than the annual average. It will be seen by a glance at the table, No. 10, that the mortality from measles is very fluctuating. The lowest number of deaths returned in a single year was in 1884, with three only; in 1890 there were only nine deaths returned, and in 1895 only seven, while the largest number to be returned in a single year was fifty-five, in 1888.

Being purely an infectious disease, the variation in the annual mortality is readily accounted for. The facility with which this disease is spread renders it one of the most difficult to control, especially since it is infectious even before a diagnosis can be made. For this reason it is probably more prolifically spread in the schools than any other disease, with the possible exception of whooping cough. Notwithstanding this fact its mortality among school children is exceedingly limited, as more than 73 per cent of the deaths from measles occurred in children under five years of age.

Of the so-called infectious and contagious diseases, the mortality from, in children under five years of age, is greatest

in whooping cough, while measles ranks second, and scarlet fever third.

A glance at Diagrams Nos. 9, 10, and 11 will graphically emphasize this assertion.

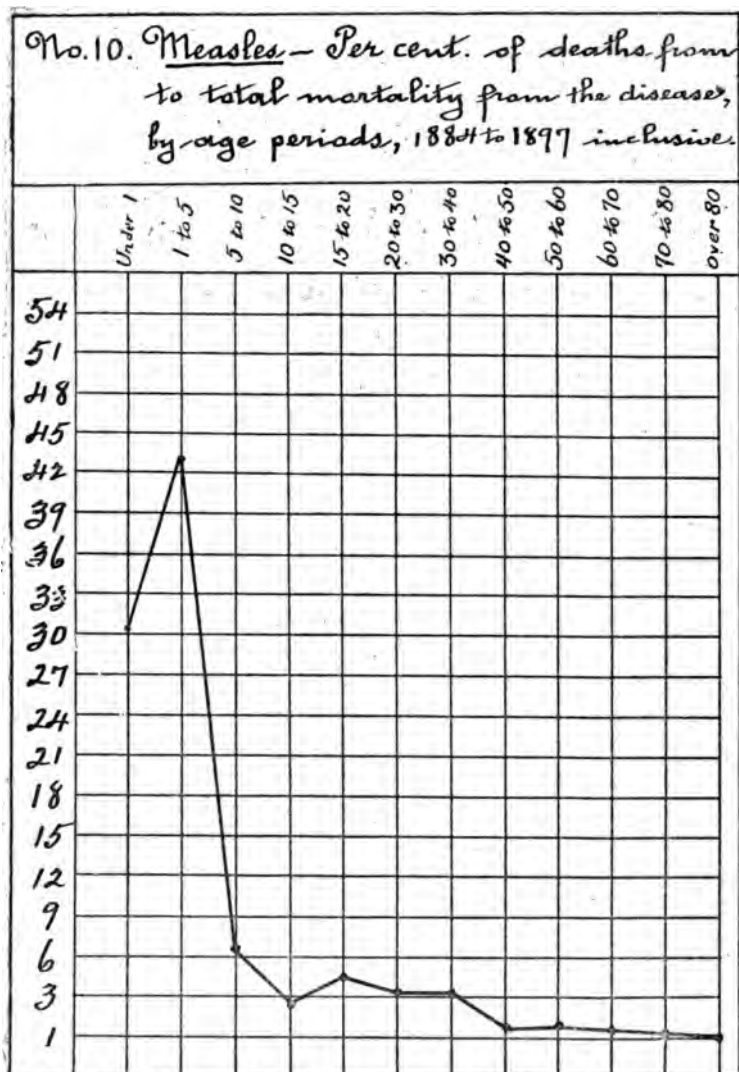


TABLE No. 10.
Measles, deaths from, by age periods, from 1884 to 1897, inclusive.

YEARS.	WHOLE NUMBER.			AGES.													
	Totals.	Males.	Females.	Unknown.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Unknown.
1884.....	3	2	1	..	1	1	..	..	1	..	..	..	..	..	..	..	..
1885.....	45	22	23	..	12	26	5	1	1	..	..	..	..	..	..	..	..
1886.....	18	10	8	..	5	13	..	..	..	..	..	..	..	..	..	..	..
1887.....	39	17	22	..	19	10	2	1	3	..	2	1	..	1	..	..	..
1888.....	55	27	28	..	14	20	6	3	2	2	5	1	1	..	1	..	..
1889.....	16	8	8	..	2	6	1	..	2	2	1	..	1	..	..	..	..
1890.....	9	9	3	..	5	4	..	..	..	..	..	..	..	..	..	..	..
1891.....	19	8	11	..	5	6	2	..	2	..	1	1	..	1	..	..	..
1892.....	24	11	13	..	7	11	..	1	1	3	..	..	1	..	..	..	..
1893.....	32	16	16	..	9	14	3	2	1	1	1	..	..	1	..	..	..
1894.....	14	9	5	..	3	8	1	1	..	..	..	..	..	1	..	..	..
1895.....	7	4	3	..	2	3	..	..	..	1	..	..	..	..	..	..	..
1896.....	23	10	13	..	6	13	1	..	2	..	..	1	..	..	..	..	..
1897.....	12	4	8	..	5	2	1	..	..	2	..	..	2	..	..	..	..
Total.....	316	154	162	..	95	137	22	9	15	11	10	4	5	3	2	1	2
Per cent.....	.....	48.73	51.27	..	30.63	43.35	6.96	2.85	4.74	3.48	3.16	1.26	1.58	.94	.63	.32	...

In measles the mortality in children under one year of age, for the period given in Table No. 10, was over 30 per cent of the total mortality from the disease; between one and five years, over 43 per cent; between five and ten nearly 7 per cent, while after the latter age there is a constantly diminishing percentage.

These facts are vividly illustrated in Diagram No. 10.

By seasons the mortality rates were greatest in the months of April, May, June, and July, and lightest in August, September, October, and November.

REGULATIONS CONTROLLING.

No circulars relative to the restriction and prevention of measles have been issued by the state board of health, but an order was promulgated and is in force requiring local boards of health to placard houses in which measles exist, as follows :

MEASLES.

Any person having measles, however mild the case may be, and all persons in a family where measles exists, *except those who have had the disease*, are forbidden to attend school or any public or private gathering, or to mingle with persons who have not had the disease.

Persons who have not had measles are prohibited from entering these premises.

All persons are strictly forbidden to remove this card without orders from the board of health.

Any violation of these regulations will be punished to the fullest extent of the law.

BOARD OF HEALTH.

The above is the only order, other than that requiring physicians to report the disease to local boards of health, that has been issued by the state board of health regarding measles.

Greater precautions should be taken to prevent persons from contracting this disease, and when the public better understand the importance of isolation it will not be so difficult to enforce the regulations necessary to restrict its spread.

Some states have already issued circulars giving the public

information in regard to this disease, and we here quote from a circular issued by the state board of health of Virginia :

PRECAUTIONS AGAINST MEASLES.

Measles is an eruptive, communicable (contagious) disease most common in childhood. It is of such universal prevalence, and the attacks are often so mild, that it has come to be looked upon as a disease which is dangerous neither to life or health. This view is, however, entirely erroneous, death or permanent injuries of the body often resulting from the disease. It kills, in other words, about twice as many persons as scarlet, typhoid, typhus and other fevers and smallpox all put together. English sanitary authorities have recently pronounced measles to be "one of the most deadly of the preventable diseases that devastate the populace of Great Britain."

But it is not because of the deaths alone that measles is a dangerous disease. It often leaves the eyes, ears, bowels, and respiratory passages of the lungs in a weakened and diseased condition. Pneumonia, bronchitis, croup, and consumption far more frequently follow measles than is generally understood. Indeed, there is good reason for believing that measles may leave children predisposed to consumption of the lungs and bowels. Impaired eyes and ears often date from an attack of measles.

In view, then, of the mortality and disability with which this disease is justly chargeable, and of the fact that preventive measures have been so generally adopted in the case of these other diseases which do so much less harm, can we longer afford to regard with indifference this serious menace to the life and health of the rising generation ? "Measles and its death toll" in this country, as abroad, may well be said to have become a question of national importance.

PERSONS LIABLE TO MEASLES.

Measles is most commonly seen in the young, although any person who has not had the disease is liable to contract it. Very few persons escape it until adult life. Second attacks have been quite frequently observed of late years, and it has

even been known to occur a third time. It is very severe in adults, and has proved extremely fatal in military camps.

PERIODS OF INCUBATION AND INFECTIONOUSNESS.

The least period required to develop the disease after exposure is four days; the average period is nine or ten days; the greatest is fourteen days.

The infectious period is from the appearance of the earliest symptoms until convalescence is completely established. The catarrhal stage preceding the eruption, in which there is cough and running from the nose, is very infectious, and the fine, bran-like scurf, which is shed in great quantities often by the skin, is full of specific poison.

HOW MEASLES SPREADS.

The specific poison of measles seems to be in the skin and in the discharge from the mouth and nose. Exposure to the presence of the sick and convalescent or to infected bedding; clothes, carpets, curtains, books, or toys is the means of spreading measles. A person visiting a case of measles may readily carry the germs in his clothing and convey the disease to others.

GENERAL PRECAUTIONS.

Measles may be avoided by sending children from home when an epidemic prevails, by keeping them from day and Sabbath schools, and by isolating the patients, thus preventing all communication with well children.

Quarantine should extend to fifteen days from the last exposure to infection and until complete recovery. Nurses should be quarantined with their patients.

PRECAUTIONS IN THE SICK ROOM.

1. It is safest to place all cases of measles under the care of a physician.
2. No persons who have not had the disease should be allowed to go into the room where persons are suffering from measles.

3. Persons who have come in contact with those suffering from measles should avoid attending public places of amusement or worship; they should not ride in cabs, omnibuses or railways until they have changed their clothes or had them disinfected by exposure to heat or soaking in boiling water.

4. In all cases the sick child or person should be separated from the family, either by removing the person affected, or removing the occupants from the sick person.

5. When the disease has broken out in a family on no account should the children be sent to school until such a time as there shall be no danger of their conveying the infection of the disease, as testified by a competent physician.

6. In rooms where persons are lying ill with the disease, the windows should occasionally be opened or kept constantly open, according to circumstances, so as to secure the escape of the poisoned air and the admission of fresh air from without. Fresh air itself is one of the most efficient remedies in the cure of all infectious diseases and the destruction of disease germs. Avoid drafts, and keep the patient well covered.

7. The sick room and everything about the sick person should be kept as clean as possible. All dirty linen should be immediately removed and put in cold water, and afterwards put into boiling water and well washed. Things that cannot be washed should, if possible, be sent, wrapped in a sheet soaked with a disinfectant solution, to some disinfecting establishment or placed in a hot oven.

8. Vessels used in a sick room should be well washed and rinsed out with some disinfectant, such as chloride of lime, carbolic acid or Condry's disinfecting fluid. Everything thrown into privies, water-closets, or drains should first be mixed with one or the other of these disinfectants.

9. Finally, we reiterate that no persons should be allowed in the sick room who have not had the disease; but if this is deemed imperative they should place themselves on the side of the bed towards which the current of air comes, to avoid the possibility of the exhalations or breath of the sufferer entering their mouth or lungs.

Those sick with measles need little medication, unless complications arise, but great care and good nursing. It is important to call in a physician at the start, and to obtain from him the fullest directions for the management of the case, and to follow these implicitly.

PRECAUTIONS DURING CONVALESCENCE.

Use every means to prevent taking cold, and until recovery is well established don't allow the patient to go upon damp ground without overshoes, or into the cold without being well wrapped up. For a violation of these precautions a life may be the penalty. If the eyes become sore and weak, as they often do during the attack, the room should be darkened and all use of the eyes forbidden for reading, sewing, or similar purposes until convalescence is well established.

Should a cold, bronchitis, or catarrh, sore eyes, or discharges from the ears or deafness remain after an attack of measles, the child should be continued under a physician's care, and every effort made by means of proper food and clothing to speedily restore it to its normal health. *A cold following measles should never be neglected.*

Since the eyes are often inflamed and usually weakened by an attack of measles, children should not be hurried to school until the strength of vision is well re-established. They should not read or study so long as the effort causes smarting or redness or watering of the eyes, or headache.

Remember, measles is a dangerous disease and to be avoided if possible; children should never be purposely exposed to it.

WHOOPIING COUGH.

Whooping cough, a disease which is altogether too largely ignored and against which no concerted action has been taken to prevent its spread in this state, has been the cause of 396 deaths among the children of New Hampshire during the past fourteen years, a mortality considerably in excess of that caused by measles.

The greatest danger from this disease is in infancy. The record shows that nearly 70 per cent of the deaths above

cited occurred in children under one year of age, while 28 per cent were between one and five years of age, with practically no deaths later in life, only one death having been reported above the age period, 10-15.

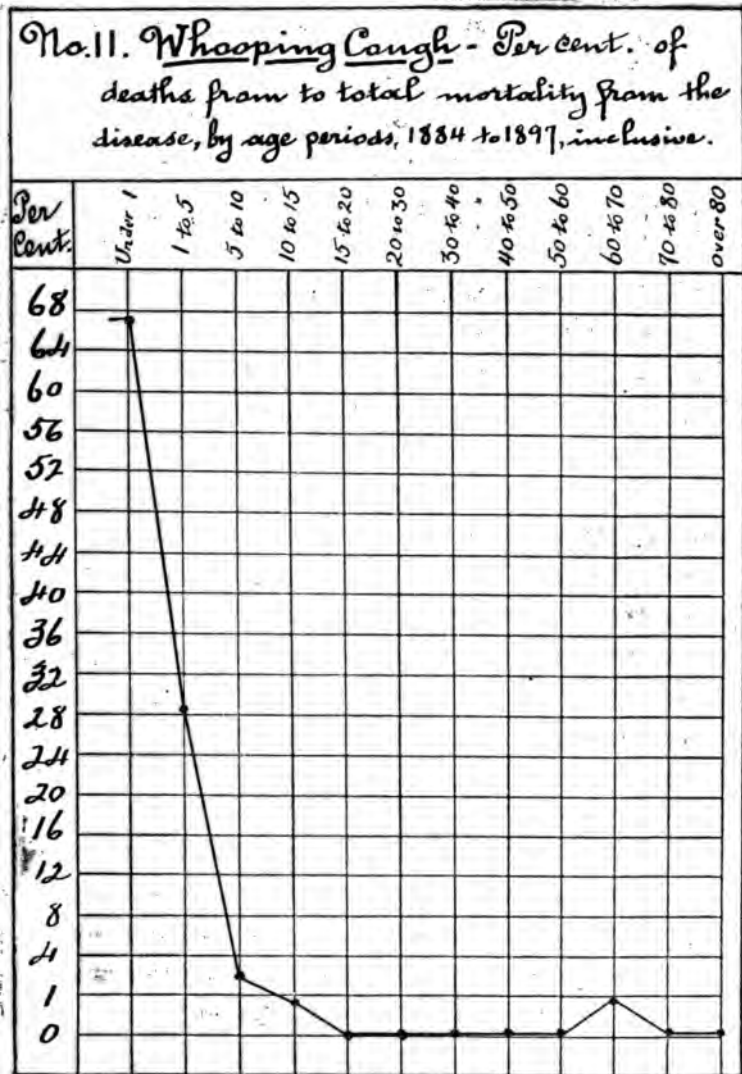


TABLE No. 11.
Whooping cough, deaths from, by age periods, from 1884 to 1897, inclusive.

YEARS.	WHOLE NUMBER.			AGES.													
	Totals.	Males.	Females.	Unknown.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Unknown.
1884.....	15	4	11	..	11	4	...	...	...	...	...	...	...	...	...	...	...
1885.....	25	11	12	2	22	8	1	...	...	...	...	...	...	...	...	...	...
1886.....	26	14	12	..	16	3	1	...	...	...	...	...	...	...	...	...	...
1887.....	21	8	13	..	11	9	1	...	...	...	...	...	...	...	...	...	...
1888.....	23	8	15	..	13	9	1	...	...	...	...	...	...	...	...	...	...
1889.....	47	23	24	..	32	14	1	...	...	...	...	...	...	...	...	...	...
1890.....	26	15	11	..	18	8	...	...	...	...	...	...	...	...	...	...	...
1891.....	27	15	12	..	25	2	...	...	...	...	...	...	...	...	...	...	...
1892.....	37	16	21	..	24	11	2	...	...	...	...	...	...	...	...	...	...
1893.....	23	12	11	..	13	9	...	...	...	...	...	...	...	...	...	...	...
1894.....	51	23	28	..	38	11	2	...	...	...	...	...	...	...	...	...	...
1895.....	26	11	15	..	19	4	2	1	...	...	...	...	...	...	...	...	...
1896.....	33	19	14	..	20	11	...	...	...	...	...	...	...	...	...	...	...
1897.....	16	5	11	..	7	8	...	...	...	...	...	...	...	...	...	...	...
Total.....	396	184	210	2	269	111	11	1	...	...	...	...	...	1	...	...	3

The chief lesson taught by this table is that every means possible ought to be adopted to protect infants from whooping cough.

MORTALITY BY SEASONS.

The death rate from whooping cough is greatest during the summer months, doubtless for the reason that cholera infantum and other disturbances incidental to warm weather are a considerable factor in the mortality rate.

CHOLERA INFANTUM.

During the years 1884-1897, inclusive, there were reported 5,103 deaths from cholera infantum in this state. This represents a terrible slaughter of infants, but even this is not all, for if to these figures were added the deaths from infantile diarrhea, dysentery, enteritis, entero-colitis, etc., the total would be considerably augmented.

Table No. 12 gives the deaths from cholera infantum, by years, sex, and age periods. It will be seen that more than 84 per cent of all the deaths under this head were among children under one year old, and that more than 99 per cent of all these deaths were in children under five years of age.

Every physician and sanitarian agrees that cholera infantum is largely preventable, being caused almost wholly by unsanitary foods and environments. In order that infants may stand a reasonable chance of withstanding this disease, they should be brought up under the best hygienic conditions.

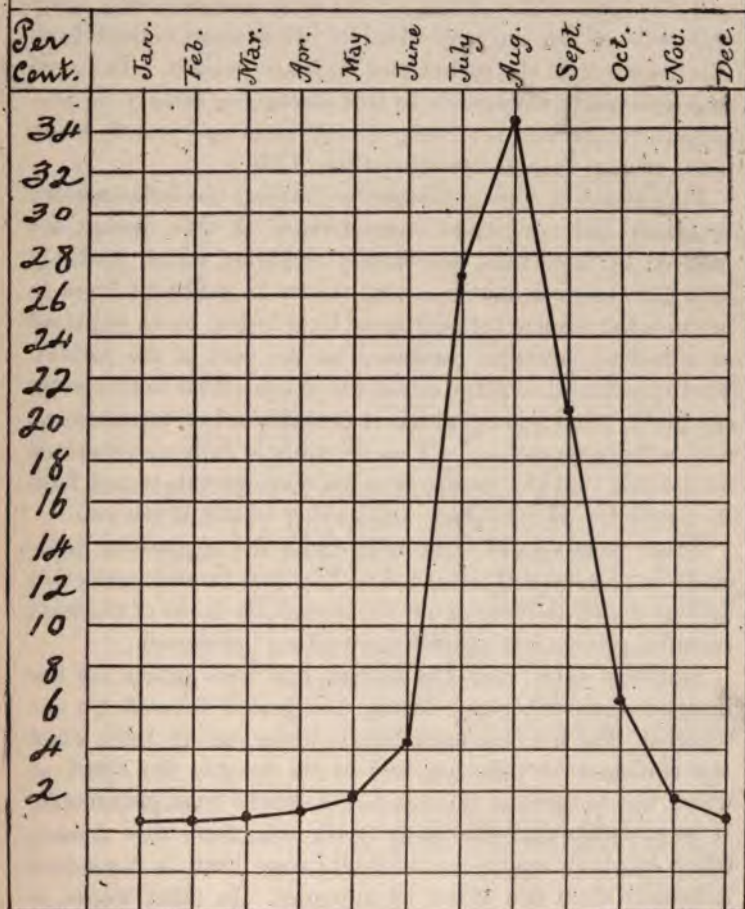
The great fatality from cholera infantum occurs during the months of July, August, and September, as will be seen by Diagram No. 12, which illustrates exactly the percentage of deaths from this cause, by months, for the fourteen years represented in Table No. 12.

TABLE No. 12.
Cholera infantum, deaths from, by age periods, from 1884 to 1897, inclusive.

YEARS.	WHOLE NUMBER.				AGES.												
	Totals.	Males.	Females.	Unknown.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Unknown.
1884.....	266	146	119	*1	214	48	....	....	....	....	1	..	1	..	..	..	2
1885.....	219	110	109	...	186	33	....	....	....	....	....	....	....	....	....	....	..
1886.....	362	202	157	*3	283	77	2	....	....	....	....	....	....	....	....	....	..
1887.....	336	174	161	*1	284	51	....	....	....	....	....	....	....	....	....	1	..
1888.....	370	212	157	*1	298	70	....	....	....	....	....	....	....	....	....	2	..
1889.....	353	190	162	*1	297	54	1	....	....	....	....	....	....	....	....	1	..
1890.....	399	216	182	*1	343	52	4	....	....	....	....	....	....	....	....	1	..
1891.....	486	252	234	...	409	74	3	....	....	....	....	....	....	....	....	2	..
1892.....	366	193	173	...	320	41	4	1	....	....	....	....	....	....	....	1	..
1893.....	423	232	191	...	369	52	2	....	....	....	....	....	....	....	....	..	..
1894.....	400	226	174	...	334	63	2	1	....	....	....	....	....	....	....	1	..
1895.....	411	203	208	...	356	53	1	....	....	....	....	....	....	....	....	1	..
1896.....	392	215	176	*1	336	55	1	....	....	....	....	....	....	....	....	..	..
1897.....	320	171	149	...	271	47	2	....	....	....	....	....	....	....	....	..	..
Total.....	5,103	2,742	2,352	*9	4,300	770	22	2	..	..	1	..	1	..	..	7	..
Per cent.....	.....	53.91	46.09	...	84.26	15.09	.43	.04	..	..	.02	..	.02	..	..	..	..

* Classed with males.

No. 12. Cholera Infantum - Per cent. of
deaths from, by months, 1884
to 1897 inclusive. 5,103 deaths



PNEUMONIA.

From 1884 to 1897 there were returned 8,602 deaths from pneumonia, that disease, next to consumption, being the most fatal in the state.

The mortality from pneumonia falls heavily upon infants and the aged. The period of life from comparatively early childhood to the maturity of adult life is more exempt from this disease than the earlier and later age periods. The aged are particularly susceptible to this disease, its fatality, in proportion to the number living of the same age period, being much greater than at any other time of life.

Pneumonia is a germ disease, or, rather, the inflammatory processes and conditions characteristic of this disease are induced by more than one variety of germs, which probably only gain admission to the lung tissues in sufficient force to produce the disease through some local lesion, or an impaired or enfeebled power of resistance on the part of the patient. There are doubtless many causes which contribute to this latter condition, chief among which is probably a low temperature, with a dry atmosphere. This certainly is fully corroborated by the fact that the disease is much more prevalent and fatal in the winter months than in any other season of the year.

These facts should carry with them the suggestion, especially to persons well advanced in life, that careful protection against the vicissitudes of our winter months is one of the most essential precautions against contracting pneumonia.

Statistics show that the disease has been rather on the increase than otherwise during the period covered by our reports. The heaviest mortality, however, was in 1892, when the epidemic of influenza was at its height, the effect of which was to increase the number of deaths from pneumonia. It is probable that the large death rate from this disease, which has been reported continually since 1889, is dependent indirectly upon the effects of influenza. In other words, it is probable that pneumonia in many cases follows as a sequel to influenza.

TABLE No. 13.
Pneumonia, deaths from, by age periods, from 1884 to 1897, inclusive.

YEAR.	AGES.													
	Totals.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Unknown.
1884	436	51	48	3	3	6	27	23	39	36	50	97	54	8
1885	504	69	49	8	4	11	15	27	32	37	72	105	74	1
1886	466	57	38	13	6	13	17	24	29	49	68	92	53	7
1887	556	68	33	7	5	13	28	32	40	48	89	121	68	4
1888	628	67	45	6	10	19	40	49	51	62	67	123	81	8
1889	582	61	50	8	12	17	29	36	40	48	98	100	79	4
1890	703	73	48	9	10	11	35	46	45	79	106	127	107	7
1891	673	73	43	15	6	11	43	31	38	73	110	126	95	9
1892	890	77	49	13	6	12	41	61	60	95	147	190	128	11
1893	685	86	65	15	5	15	36	39	55	60	95	120	88	6
1894	633	88	62	13	4	11	29	38	48	63	87	103	83	4
1895	639	69	62	11	8	16	27	32	46	57	101	127	74	9
1896	557	103	96	8	5	10	22	29	35	34	68	82	63	2
1897	650	122	82	13	7	9	22	36	33	56	78	100	87	5
Total . . .	8,602	1,064	770	142	91	174	411	503	582	797	1,236	1,613	1,134	85

Table No. 13 shows the number of deaths annually from pneumonia since 1884, by age periods, with totals. Of the deaths returned from this disease, a little over 48 per cent were males, and a fraction over 51 per cent females.

BRONCHITIS.

Of the diseases affecting the respiratory organs bronchitis ranks second to pneumonia, there having been reported during the past fourteen years 2,050 deaths from acute bronchitis, 909 males and 1,139 females.

Like pneumonia, this is a disease essentially of infancy and old age, it being especially severe in infants under one year of age. As far as its fatality is concerned, both by age periods and seasons, it runs almost parallel with pneumonia, and might in this respect be considered almost as another phase of that disease. It is governed by practically the same conditions, and, therefore, the same precautions should be exercised in its prevention.

Table No. 14 shows the mortality from acute bronchitis from 1884 to 1897, inclusive, by years, sex and age periods. In the matter of seasons the mortality was greatest in January, March, February, April, and December, and although deaths were reported at all seasons of the year, the mortality is relatively light during the summer months.

INFLUENZA.

When epidemic influenza struck the state, in 1890, it is probable that a majority of the physicians had never before seen the disease in epidemic form, and many did not recognize its nature for quite a period after it had invaded the state. For a time it went under the term "la grippe," and is even now so called by some. The disease, however, while regarded as new by some, is as old as history and many times has appeared as an epidemic in all parts of the world.

While the mortality is small in proportion to the number of persons attacked, it is far from being a disease that can be ignored. This statement will be accepted as true when it is

TABLE No. 14.
Bronchitis, deaths from, by age periods, 1884 to 1897, inclusive.

YEARS.	WHOLE NUMBER.				AGES.												
	Totals.	Males.	Females.	Unknown.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Unknown.
1884....	79	35	44	.....	15	8	1	1	.....	5	5	3	10	4	13	13	1
1885....	108	41	67	.....	28	12	2	1	.....	2	4	1	3	10	19	25	1
1886....	81	39	42	.....	16	14	2	1	.....	4	2	2	2	7	12	19	.....
1887....	114	56	58	.....	31	22	3	.....	.....	.....	.....	2	8	7	25	15	1
1888....	142	64	77	*1	39	21	3	.....	.....	.....	.....	3	7	9	25	21	2
1889....	127	50	77	.....	28	28	1	.....	.....	.....	.....	8	12	12	15	19	.....
1890....	194	89	105	.....	48	17	2	2	.....	.....	.....	5	12	22	29	46	1
1891....	162	72	90	.....	49	12	4	.....	.....	.....	.....	3	7	17	27	26	2
1892....	217	95	122	.....	48	20	2	.....	.....	.....	.....	9	14	30	53	80	2
1893....	161	73	88	.....	62	25	2	.....	.....	.....	.....	3	9	7	21	21	2
1894....	163	72	91	.....	58	32	.....	.....	.....	.....	.....	5	6	6	23	23	.....
1895....	165	60	105	.....	48	28	1	.....	.....	.....	.....	1	11	13	24	23	2
1896....	136	62	74	.....	45	31	2	.....	.....	.....	.....	2	9	11	13	18	1
1897....	201	101	99	*1	73	48	5	.....	.....	.....	.....	.....	12	15	22	13	2
Total.	2,050	909	1,139	*2	588	318	30	11	11	59	44	47	122	170	321	312	17

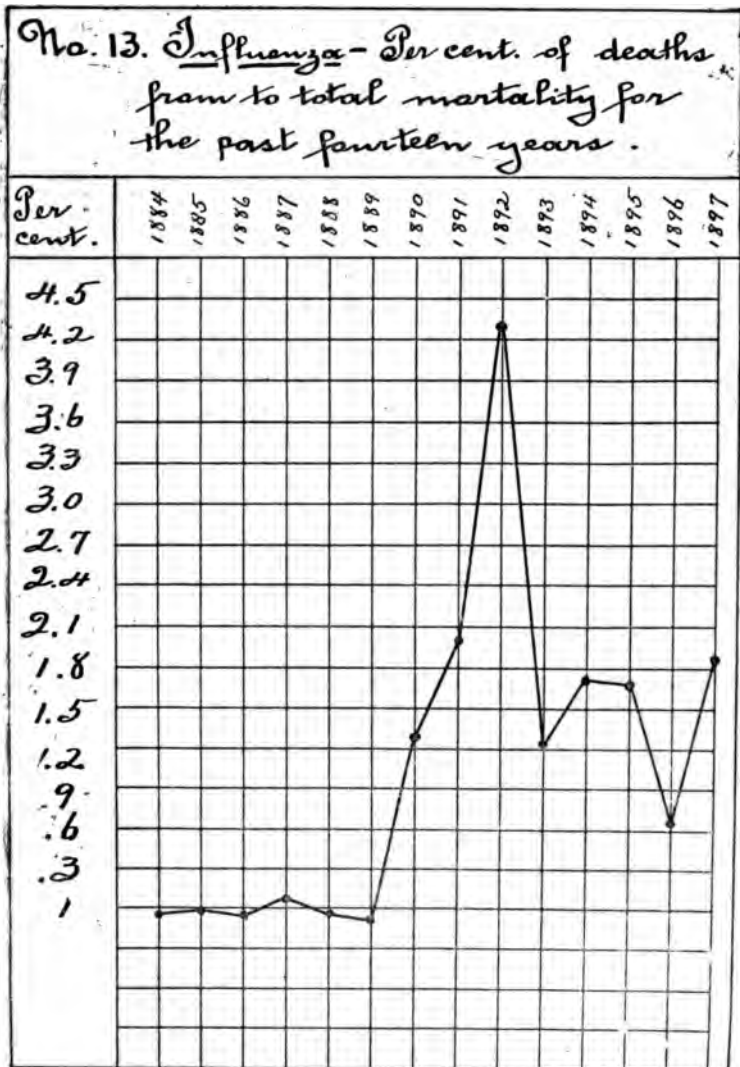
* Classified with males.

TABLE No. 15.
Influenza, deaths from, by age periods, 1884 to 1897, inclusive.

YEARS.	WHOLE NUMBER.				AGES.													
	Totals.	Males.	Females.	Unknown.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Unknown.	
1884....	3	2	1	.....	1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1	.....
1885....	6	2	4	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1	2	.....	2	.....
1886....	5	3	2	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....
1887....	9	4	5	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	5	.....	.....
1888....	6	2	4	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	1	2	1	1	.....
1889....	4	1	3	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1890....	95	45	49	*1	14	7	2	1	1	9	1	6	8	5	24	17	.....	.....
1891....	143	64	79	.....	15	16	3	.....	1	.....	4	2	10	26	33	31	2	.....
1892....	331	144	187	.....	26	16	2	2	3	6	10	11	17	49	87	100	2	.....
1893....	91	47	44	.....	9	6	1	1	3	2	2	6	3	10	22	25	1	.....
1894....	121	44	77	.....	5	3	1	1	4	3	4	4	9	22	34	30	1	.....
1895....	121	62	59	.....	10	4	.....	2	1	5	2	4	10	10	40	33	.....	.....
1896....	47	16	31	.....	2	.....	.....	1	2	4	.....	2	1	10	12	12	1	.....
1897....	130	57	73	.....	15	2	1	2	1	3	5	9	9	15	40	27	1	.....
Total.	1,112	493	618	*1	109	54	10	10	16	32	28	45	67	149	299	285	8	.....

* Classified with males.

known that during the period covered by this report there have been from this disease 1,112 deaths in the state of New Hampshire, 493 males and 618 females. Most of these deaths



have occurred since 1890. The largest number of deaths from this disease in a single year was in 1892, with 331, while in 1897 there were 130 deaths, showing that at the close of the latter year the epidemic was by no means exhausted.

Table No. 15 shows the number of deaths from this disease since 1884, by years, sex, and age periods, with totals.

Diagram No. 13 is a remarkably graphic one, showing the eccentric fluctuations of influenza for the period given.

Neither the table nor the diagram illustrates fully, however, the effect of the epidemic at its onset, because its force was largely expended on the sick, the fatal results of which were recorded under other diseases. As an illustration of this assertion attention is called to Diagrams Nos. 1 and 2, under consumption, where the effect of influenza will be seen in the sharp angle of increase under the year 1890, while in pneumonia the number of deaths was increased in 1890 from 582 in the previous year to 703 in the year mentioned.

It is possible that a study of other diseases will also show an increased mortality as a result of epidemic influenza.

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In the foregoing we have given some statistics of and briefly considered the chief so-called communicable diseases—diseases against which the means of restriction and prevention are more or less well understood.

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Reports from authorities in the United States and Europe of reliable standing, show a very large number of cases of diphtheria in which the anti-diphtheritic serum has been employed, demonstrating beyond successful contradiction its great effect in reducing the mortality from this disease. It seems to us that there can be no longer any doubt upon this point. Hospital records, as far as we know, without an exception where antitoxin has been thoroughly tried show a very marked reduction in the mortality rates of diphtheria, as compared with an equal number of cases received and cared for under similar circumstances before the employment of this treatment.

The report of the medical officer in charge of the hygienic laboratory of the United States Marine Hospital Service states that the published reports of one hundred physicians and twenty boards of health for the year 1895 and a portion of 1896 show 7,021 cases of diphtheria treated by antitoxin, with 704 deaths, a death rate of 10.6 per cent, as compared with 2,936 cases of diphtheria occurring synchronously, with 1,110 deaths, a mortality rate of 39 per cent.

Since these statements were gathered a lower death rate under the use of antitoxin has often been recorded, chiefly through the knowledge that to obtain the best results the serum must be used as early as possible in the development of the disease. The report of the Harper Hospital, Detroit, during the year 1896, shows that there were admitted 112 cases of diphtheria, 12 being subjected to intubation, 6 to tracheotomy, with only 5 deaths, 3 of which were dying when brought to the hospital. In 1897 there were 90 cases of diphtheria in the hospital with 6 deaths. Antitoxin was used both years.

This low death rate led the Detroit board of health* to

* Louisville Medical Journal.

decide to furnish diphtheria antitoxin gratuitously to patients too poor to pay for it, this also including patients under charge of the city physicians, poor patients at Harper hospital, sent there by the board of health, at the Woman's hospital, and at the Protestant Orphan asylum. This was done from May 1, 1896, and the number of patients so treated up to February 28, 1897, close of the official year, was as follows :

	Cases.	Deaths.	Mortality Rate.
With antitoxin	374	47	12.56 per cent.
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In continuation of this series of observations are the following results from figures not yet made public, but kindly furnished me by the board of health. From March 1, 1897, up to December, the following cases came under either the notice or care of the board :

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It should, however, be borne in mind that the variation in hospital statistics may be due largely to the condition of the patient when admitted, as it is conceded that in advanced cases the antitoxin may be of little or no benefit.

A Russian report on this subject also contains valuable evidence. A special committee of St. Petersburg physicians, occupied last year with the investigation of this subject, obtained data from physicians who had used the serum, and great care is said to have been exercised in the entire investigation. In 44,631 registered cases in which the serum was used, the mortality was found to be 14.6 per cent, while in 6,507 cases where the serum was not employed, 34 per cent of the cases ended fatally. It is said that the results are so marked that confidence is expressed in the treatment even by the peasants, and that eleven Russian laboratories are engaged in the production of the serum.

The governments of Bosnia and Herzegovina have made the use of diphtheria antitoxin compulsory, both as a curative

and a preventive. The great value of this treatment is set forth in almost all current medical journals. The *Oklahoma Sanitary Bulletin* says: "We think the time has come when physicians are liable to just criticism who fail to use antitoxin." While this is an advanced position to take, we support that view of the matter, and recommend its use, especially in the early stages of the disease and when other conditions do not contra-indicate its employment. We believe that the prompt use of antitoxin within the first three or four days after the invasion of the disease would save many lives. Parents should be impressed with the very great importance of calling a physician as soon as this disease is suspected to exist in any member of the family.

In the report of Dr. Henry Kenwood, Medical Officer of Health, St. Mary, Stoke Newington, the following observations occur: "Ample time has now been afforded for testing the efficacy of 'antitoxin' in the treatment of diphtheria, and the opportunities have been all too frequent during the past six or seven years. Good reports upon its employment come from all quarters of the globe, and the very few contrary statements which have come to hand have either been based upon inadequate trial or improper employment of the serum. The remedy is too generally used as a *dernier ressort* after the patient is moribund or requires tracheotomy, and even then it is notorious how rapidly the distressing symptoms, as a rule, melt away. It is thought by some that although it does such a great deal of good during the acute attack, it does not diminish, even if it does not increase, the subsequent tendency to fatal heart failure. I know of no convincing statistics in support of this point, but it is conceivable that if antitoxin is the means of bringing a patient over the acute attack, it may appear to increase the number of deaths from subsequent heart failure from the circumstance that it enables many to reach the dangerous period following the acute attack, who otherwise would have died beforehand."

The astounding value of antitoxin* as a remedy for diphtheria has now for some considerable time been proved beyond the possibility of cavil. Even those conservative practitioners

* Pediatrics.

who always look upon everything new with an eye of distrust, and regard each fresh remedy as a fad, have at last been compelled to give in, and freely acknowledge the great merits of antitoxin. According to the *Lancet*, The Imperial Statistical Office has recently published the returns of the causes of death in the towns of Germany of more than 15,000 inhabitants, from the year 1885 to 1895. These returns show that from 1885 to 1894 there were 119,038 deaths from diphtheria or croup, the average number thus being 11,904 per annum. The maximum was reached in 1893 by 15,860 deaths, and the minimum in 1888 by 9,934 deaths. In 1895, when diphtheria antitoxin was first used on a large scale, the deaths went down to 7,266. The diphtheria death rate was 10.69 per 10,000 in the preceding ten years and only 5.4 in 1895, so that the mortality had fallen 49.48 per cent. Of 100 deaths, 4.53 were caused by diphtheria from 1885 to 1894 and only 2.53 in 1895. The decrease of the death rate from diphtheria was almost uniform in every district of the empire. The prevalence of the disease, however, was about the same as it had been for the last twenty years, and it is therefore unquestionable that the serum treatment has had the effect of producing a remarkable improvement. Dr. Barbier reports great success in the treatment of pure diphtheria in France by intubation. Out of fifty-four cases of pure diphtheria, thirteen of which were laryngeal cases, intubation was performed with the result of saving life in each instance.

The *International Medical Annual* for the current year makes this statement: "If the profession and public once grasp the truth, that, with rare exceptions, no child ought to die of diphtheria, it is probable that the actual mortality will become very low."

The health commissioner of Denver, Col., Dr. William P. Munn, gives the following mortality statistics with reference

to the treatment of diphtheria in that city, with and without antitoxin :

	Year.	Cases.	Deaths.	Mortality per cent.
Before antitoxin was dis- covered.....	1888	.....	120	.....
	1889	233	109	46.5
	1890	720	277	38.6
	1891	468	175	37.4
	1892	300	89	29.7
	1893	318	106	33.3
	1894	233	71	28.7
Antitoxin introduced	1895	248	40	16.1
Treated with antitoxin		123	9	7.3
Treated without antitoxin		125	31	25.1
	1896	246	19	7.7
Treated with antitoxin		107	7	6.5
Treated without antitoxin.....		139	12	8.7
	1897	297	43	14.5
Treated with antitoxin.....		147	6	4.1
Treated without antitoxin.....		150	37	24.6

Dr. John H. McCollom, in an able paper read at the last meeting of the Massachusetts Medical Society, on "Antitoxin in the Treatment of Diphtheria,"* states his conclusions as follows :

From an examination of mortuary statistics, both in this country and in Europe; from a clinical study of 4,200 cases of diphtheria, it seems to me that the following conclusions are absolutely correct :

* Vide The Boston Med. and Surg. Journal, Aug. 13, 1898.

1. That the death rate of diphtheria has been reduced to a remarkable degree by the use of antitoxin.
2. That in order to derive full benefit from this agent it is important that it should be given in large doses early in the course of the disease.
3. That antitoxin should be frequently repeated, until the characteristic effect is produced on the diphtheritic membrane.
4. That antitoxin does not cause albuminuria, and that it has no effect in producing heart complications in this disease.
5. That the physician who does not use antitoxin in the treatment of diphtheria fails to do his whole duty to his patient.

In a recent address before the Sanitary Institute of Great Britain Dr. G. Sims Woodhead said :

“For the last three or four years most of us have been carefully noting the results of the antitoxin treatment of diphtheria. For my own part, I may state at once that I am satisfied that where antitoxin is given early enough and in sufficient quantity it is practically a specific in the treatment of diphtheria. It may be asked, why then does not diphtheria disappear from amongst us ? To those who have studied the genesis of the disease the answer is simple enough. Although antitoxin can never take the place of improved sanitary conditions in doing away with the breeding places of the diphtheria bacillus outside the human body, it may be looked upon as an almost perfect protective against the action of the diphtherial poison in the body. As regards the curative action of antitoxic serum, I have little new to tell you beyond the fact that during the year 1897 the death rate from diphtheria in the hospitals of the Metropolitan asylums board fell to a still lower figure than in any previous year, the mortality last year being only 17.5 per cent, a figure that at one time would have been looked upon as absolutely chimerical, taking into consideration the fact that so many of the cases have already been under treatment for considerable periods, and are only sent into hospital either for surgical interference, or because there remains little hope of recovery outside.

Amongst cases of post-scarlatinal diphtheria there has been a still greater falling off in the mortality. At one time something like 60 per cent of the convalescent scarlatinal patients who afterwards contracted diphtheria succumbed. Now under the antitoxin treatment, in one hospital of which I have statistics the death rate is about 2 per cent, while in another nearly 100 cases were treated last year without a single death.

"Now, gentlemen, does not all this point in one direction, and in one direction only? Wherever there is an outbreak of diphtheria the first thing to be done is to inject not only the patient with a curative dose, but all who can possibly be exposed to infection with a protective dose of antitoxin. This is the only logical outcome of the experiments and experience of the last few years. . . . Now that antitoxin is so much more potent than it was at one time and that the conditions of preparation and storage have been so much improved, most of the objections to the administration of protective doses have been removed, and the advantages to be gained are so great that I look forward with confidence to the time when this method of assisting sanitary administrators will be received with the favor that it deserves. It is a step which may be taken at once as soon as there is even a suspicion of the presence of the disease, the earlier the better; it is not even necessary to isolate immediately, as all those injected are at once protected. It does not in any way interfere with the carrying out of sanitary improvements, and although it does not ultimately take the place of these improvements it protects the inmates of the infected houses whilst the improvements are being carried out."

The experience of the Massachusetts State Board of Health, in the production and use of antitoxin in diphtheria, further corroborates the favorable opinion everywhere expressed when this agent has been carefully and conscientiously used. The board produces its own antitoxin, and during the three years ending March 31, 1898, distributed 9,611 bottles of the serum, each package representing 1,000 antitoxin units.

An increase in the demand for this agent is shown by the

fact that in 1896, 1,724 bottles were distributed; in 1897, 3,219; and in 1898, 4,668 bottles. The increased demand was owing to the greater favor with which the agent was received by physicians, rather than to any increase in the prevalence of diphtheria. The board says :*

"Very little is now heard in opposition to the use of antitoxin as compared with that which was manifest during the first year after its introduction. The figures presented in this report speak for themselves so far as the reduction which has taken place in the fatality of diphtheria is concerned. The fatality in the pre-antitoxin period, as shown in past reports of this board, was 28.3 per cent for the period of four years, 1891-94, while during the years 1895-97 the general fatality from diphtheria throughout the state was only 16.

"In the last annual report a summary of the statistics of fatality from diphtheria in certain other states and countries was presented, comprising about 20,000 cases. Very much additional testimony of the same kind might be added this year, the accumulation of which all tends to show the value of diphtheria antitoxin. The publication of such material, however, is now scarcely necessary, since the medical profession as a whole may be said to have adopted the remedy as one of the most important additions to the list of therapeutic agents. The following statement, published in the annual report for 1896, applies equally to the results of the year 1897 :

"It is quite plain that a comparison of the fatality of cases treated with antitoxin with the general fatality of cases of diphtheria previous to the introduction of this therapeutic agent, or even with cases not treated with antitoxin, which occurred at the same period with those so treated, does not do justice to the merits of antitoxin, for the reason that such a comparison must be made between two groups or classes of cases which are not strictly comparable, since one contains a larger and the other a smaller percentage of severe cases. That is to say, the general run of cases treated with antitoxin by physicians in private practice, and especially of those sent

* Annual report of the State Board of Health of Massachusetts, 1897.

to hospital, must necessarily be a selected class, in which the percentage of severe cases is greater than it is in the whole number of cases of diphtheria occurring or reported in a given community.

"It has been urged, and with some degree of reason, that the diminution in the fatality from diphtheria is partly due to the introduction of bacterial diagnosis by means of cultures from the throat, whereby mild cases of illness are shown to be cases of true diphtheria which would otherwise have passed unnoticed. But this statement is in some measure offset by the fact that a considerable number of cases which might have passed for diphtheria before the days of bacterial diagnosis are now classed as 'negative.'

"The present report gives support to the belief that the value of this argument has been over-estimated, since the cases in which cultures were made are here separated from those in which they were omitted, and the fatality in each group differs but slightly. This fact does not, however, in the least degree undervalue the importance of having a careful diagnosis made by means of cultures in each case, either before the administration of antitoxin, or as soon as possible after the beginning of treatment.

"The most important lesson which is taught by these returns is the necessity of *early administration of the antitoxin in each and every case.*

"Out of 294 cases in which antitoxin was administered on the first day of illness there were only 13 deaths, or 4.4 per cent; and out of 711 cases treated during the first two days of illness there were only 46 deaths, or 6.5 per cent; while the deaths in 156 cases in which antitoxin was not employed until the sixth and seventh days and later were 30, or 19.2 per cent, the patients in the former instances having a chance of living three times as great as in the latter."

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A Russian report on this subject also contains valuable evidence. A special committee of St. Petersburg physicians, occupied last year with the investigation of this subject, obtained data from physicians who had used the serum, and great care is said to have been exercised in the entire investigation. In 44,631 registered cases in which the serum was used, the mortality was found to be 14.6 per cent, while in 6,507 cases where the serum was not employed, 34 per cent of the cases ended fatally. It is said that the results are so marked that confidence is expressed in the treatment even by the peasants, and that eleven Russian laboratories are engaged in the production of the serum.

The governments of Bosnia and Herzegovina have made the use of diphtheria antitoxin compulsory, both as a curative

and a preventive. The great value of this treatment is set forth in almost all current medical journals. The *Oklahoma Sanitary Bulletin* says: "We think the time has come when physicians are liable to just criticism who fail to use antitoxin." While this is an advanced position to take, we support that view of the matter, and recommend its use, especially in the early stages of the disease and when other conditions do not contra-indicate its employment. We believe that the prompt use of antitoxin within the first three or four days after the invasion of the disease would save many lives. Parents should be impressed with the very great importance of calling a physician as soon as this disease is suspected to exist in any member of the family.

In the report of Dr. Henry Kenwood, Medical Officer of Health, St. Mary, Stoke Newington, the following observations occur: "Ample time has now been afforded for testing the efficacy of 'antitoxin' in the treatment of diphtheria, and the opportunities have been all too frequent during the past six or seven years. Good reports upon its employment come from all quarters of the globe, and the very few contrary statements which have come to hand have either been based upon inadequate trial or improper employment of the serum. The remedy is too generally used as a *dernier ressort* after the patient is moribund or requires tracheotomy, and even then it is notorious how rapidly the distressing symptoms, as a rule, melt away. It is thought by some that although it does such a great deal of good during the acute attack, it does not diminish, even if it does not increase, the subsequent tendency to fatal heart failure. I know of no convincing statistics in support of this point, but it is conceivable that if antitoxin is the means of bringing a patient over the acute attack, it may appear to increase the number of deaths from subsequent heart failure from the circumstance that it enables many to reach the dangerous period following the acute attack, who otherwise would have died beforehand."

The astounding value of antitoxin* as a remedy for diphtheria has now for some considerable time been proved beyond the possibility of cavil. Even those conservative practitioners

* Pediatrics.

who always look upon everything new with an eye of distrust, and regard each fresh remedy as a fad, have at last been compelled to give in, and freely acknowledge the great merits of antitoxin. According to the *Lancet*, The Imperial Statistical Office has recently published the returns of the causes of death in the towns of Germany of more than 15,000 inhabitants, from the year 1885 to 1895. These returns show that from 1885 to 1894 there were 119,038 deaths from diphtheria or croup, the average number thus being 11,904 per annum. The maximum was reached in 1893 by 15,860 deaths, and the minimum in 1888 by 9,934 deaths. In 1895, when diphtheria antitoxin was first used on a large scale, the deaths went down to 7,266. The diphtheria death rate was 10.69 per 10,000 in the preceding ten years and only 5.4 in 1895, so that the mortality had fallen 49.48 per cent. Of 100 deaths, 4.53 were caused by diphtheria from 1885 to 1894 and only 2.53 in 1895. The decrease of the death rate from diphtheria was almost uniform in every district of the empire. The prevalence of the disease, however, was about the same as it had been for the last twenty years, and it is therefore unquestionable that the serum treatment has had the effect of producing a remarkable improvement. Dr. Barbier reports great success in the treatment of pure diphtheria in France by intubation. Out of fifty-four cases of pure diphtheria, thirteen of which were laryngeal cases, intubation was performed with the result of saving life in each instance.

The *International Medical Annual* for the current year makes this statement: "If the profession and public once grasp the truth, that, with rare exceptions, no child ought to die of diphtheria, it is probable that the actual mortality will become very low."

The health commissioner of Denver, Col., Dr. William P. Munn, gives the following mortality statistics with reference

to the treatment of diphtheria in that city, with and without antitoxin :

	Year.	Cases.	Deaths.	Mortality per cent.
Before antitoxin was discovered.....	1888	.....	120	.....
	1889	233	109	46.5
	1890	720	277	38.6
	1891	468	175	37.4
	1892	300	89	29.7
	1893	318	106	33.3
	1894	233	71	28.7
Antitoxin introduced	1895	248	40	16.1
Treated with antitoxin .....	.....	123	9	7.3
Treated without antitoxin .....	.....	125	31	25.1
Treated with antitoxin	1896	246	19	7.7
	.....	107	7	6.5
	.....	139	12	8.7
Treated without antitoxin...	1897	297	43	14.5
	.....	147	6	4.1
	.....	150	37	24.6

Dr. John H. McCollom, in an able paper read at the last meeting of the Massachusetts Medical Society, on "Antitoxin in the Treatment of Diphtheria,"* states his conclusions as follows :

From an examination of mortuary statistics, both in this country and in Europe; from a clinical study of 4,200 cases of diphtheria, it seems to me that the following conclusions are absolutely correct :

* Vide The Boston Med. and Surg. Journal, Aug. 18, 1898.

1. That the death rate of diphtheria has been reduced to a remarkable degree by the use of antitoxin.
2. That in order to derive full benefit from this agent it is important that it should be given in large doses early in the course of the disease.
3. That antitoxin should be frequently repeated, until the characteristic effect is produced on the diphtheritic membrane.
4. That antitoxin does not cause albuminuria, and that it has no effect in producing heart complications in this disease.
5. That the physician who does not use antitoxin in the treatment of diphtheria fails to do his whole duty to his patient.

In a recent address before the Sanitary Institute of Great Britain Dr. G. Sims Woodhead said :

"For the last three or four years most of us have been carefully noting the results of the antitoxin treatment of diphtheria. For my own part, I may state at once that I am satisfied that where antitoxin is given early enough and in sufficient quantity it is practically a specific in the treatment of diphtheria. It may be asked, why then does not diphtheria disappear from amongst us ? To those who have studied the genesis of the disease the answer is simple enough. Although antitoxin can never take the place of improved sanitary conditions in doing away with the breeding places of the diphtheria bacillus outside the human body, it may be looked upon as an almost perfect protective against the action of the diphtherial poison in the body. As regards the curative action of antitoxic serum, I have little new to tell you beyond the fact that during the year 1897 the death rate from diphtheria in the hospitals of the Metropolitan asylums board fell to a still lower figure than in any previous year, the mortality last year being only 17.5 per cent, a figure that at one time would have been looked upon as absolutely chimerical, taking into consideration the fact that so many of the cases have already been under treatment for considerable periods, and are only sent into hospital either for surgical interference, or because there remains little hope of recovery outside.

Amongst cases of post-scarlatinal diphtheria there has been a still greater falling off in the mortality. At one time something like 60 per cent of the convalescent scarlatinal patients who afterwards contracted diphtheria succumbed. Now under the antitoxin treatment, in one hospital of which I have statistics the death rate is about 2 per cent, while in another nearly 100 cases were treated last year without a single death.

"Now, gentlemen, does not all this point in one direction, and in one direction only? Wherever there is an outbreak of diphtheria the first thing to be done is to inject not only the patient with a curative dose, but all who can possibly be exposed to infection with a protective dose of antitoxin. This is the only logical outcome of the experiments and experience of the last few years. . . . Now that antitoxin is so much more potent than it was at one time and that the conditions of preparation and storage have been so much improved, most of the objections to the administration of protective doses have been removed, and the advantages to be gained are so great that I look forward with confidence to the time when this method of assisting sanitary administrators will be received with the favor that it deserves. It is a step which may be taken at once as soon as there is even a suspicion of the presence of the disease, the earlier the better; it is not even necessary to isolate immediately, as all those injected are at once protected. It does not in any way interfere with the carrying out of sanitary improvements, and although it does not ultimately take the place of these improvements it protects the inmates of the infected houses whilst the improvements are being carried out."

The experience of the Massachusetts State Board of Health, in the production and use of antitoxin in diphtheria, further corroborates the favorable opinion everywhere expressed when this agent has been carefully and conscientiously used. The board produces its own antitoxin, and during the three years ending March 31, 1898, distributed 9,611 bottles of the serum, each package representing 1,000 antitoxin units.

An increase in the demand for this agent is shown by the

fact that in 1896, 1,724 bottles were distributed; in 1897, 3,219; and in 1898, 4,668 bottles. The increased demand was owing to the greater favor with which the agent was received by physicians, rather than to any increase in the prevalence of diphtheria. The board says :*

"Very little is now heard in opposition to the use of antitoxin as compared with that which was manifest during the first year after its introduction. The figures presented in this report speak for themselves so far as the reduction which has taken place in the fatality of diphtheria is concerned. The fatality in the pre-antitoxin period, as shown in past reports of this board, was 28.3 per cent for the period of four years, 1891-94, while during the years 1895-97 the general fatality from diphtheria throughout the state was only 16.

"In the last annual report a summary of the statistics of fatality from diphtheria in certain other states and countries was presented, comprising about 20,000 cases. Very much additional testimony of the same kind might be added this year, the accumulation of which all tends to show the value of diphtheria antitoxin. The publication of such material, however, is now scarcely necessary, since the medical profession as a whole may be said to have adopted the remedy as one of the most important additions to the list of therapeutic agents. The following statement, published in the annual report for 1896, applies equally to the results of the year 1897 :

"It is quite plain that a comparison of the fatality of cases treated with antitoxin with the general fatality of cases of diphtheria previous to the introduction of this therapeutic agent, or even with cases not treated with antitoxin, which occurred at the same period with those so treated, does not do justice to the merits of antitoxin, for the reason that such a comparison must be made between two groups or classes of cases which are not strictly comparable, since one contains a larger and the other a smaller percentage of severe cases. That is to say, the general run of cases treated with antitoxin by physicians in private practice, and especially of those sent

* Annual report of the State Board of Health of Massachusetts, 1897.

to hospital, must necessarily be a selected class, in which the percentage of severe cases is greater than it is in the whole number of cases of diphtheria occurring or reported in a given community.

"It has been urged, and with some degree of reason, that the diminution in the fatality from diphtheria is partly due to the introduction of bacterial diagnosis by means of cultures from the throat, whereby mild cases of illness are shown to be cases of true diphtheria which would otherwise have passed unnoticed. But this statement is in some measure offset by the fact that a considerable number of cases which might have passed for diphtheria before the days of bacterial diagnosis are now classed as 'negative.'

"The present report gives support to the belief that the value of this argument has been over-estimated, since the cases in which cultures were made are here separated from those in which they were omitted, and the fatality in each group differs but slightly. This fact does not, however, in the least degree undervalue the importance of having a careful diagnosis made by means of cultures in each case, either before the administration of antitoxin, or as soon as possible after the beginning of treatment.

"The most important lesson which is taught by these returns is the necessity of *early administration of the antitoxin in each and every case.*

"Out of 294 cases in which antitoxin was administered on the first day of illness there were only 13 deaths, or 4.4 per cent; and out of 711 cases treated during the first two days of illness there were only 46 deaths, or 6.5 per cent; while the deaths in 156 cases in which antitoxin was not employed until the sixth and seventh days and later were 30, or 19.2 per cent, the patients in the former instances having a chance of living three times as great as in the latter."

INSPECTION OF SUMMER RESORTS.

CONCORD, N. H., September 30, 1898.

*Irving A. Watson, M. D., Secretary State Board of Health,
Concord, N. H. :*

DEAR DOCTOR,—I have the honor to report an inspection of some of the prominent summer resorts in the White Mountains. Our board has always taken occasion to inspect the hotels in this region, believing them to be public buildings, and therefore, this may properly be considered as a part of our duties. This work is undertaken in the interest of the state, and not in a spirit of criticism. I am happy to report that in every instance I was most cordially greeted by the managers and proprietors.

It is now a well established fact that the summer visitor and tourist has become critical on matters pertaining to sanitation, and the managers of hotels and boarding-houses well understand that a single case of preventable disease will cause an exodus of visitors from a house almost as quickly as a conflagration.

It seems that the present season has been a popular one for summer visitors in the mountains, as all the principal hotels report having had a most excellent season, with full houses from early in July until the middle of September.

The Fabyan House was remodeled, the plumbing was largely taken out and replaced, bath rooms were added, and considerable work done upon the grounds about two years ago. It is in thoroughly good condition and has modern improved fire escapes, which were added to the house at that time. The water supply and drainage are of the best, and are systematically and intelligently looked after and maintained. When the house was remodeled, the improvements were made in the bath rooms, which are thoroughly appreciated by the guests.

THE USE OF DIPHTHERIA ANTITOXIN.

Reports from authorities in the United States and Europe of reliable standing, show a very large number of cases of diphtheria in which the anti-diphtheritic serum has been employed, demonstrating beyond successful contradiction its great effect in reducing the mortality from this disease. It seems to us that there can be no longer any doubt upon this point. Hospital records, as far as we know, without an exception where antitoxin has been thoroughly tried show a very marked reduction in the mortality rates of diphtheria, as compared with an equal number of cases received and cared for under similar circumstances before the employment of this treatment.

The report of the medical officer in charge of the hygienic laboratory of the United States Marine Hospital Service states that the published reports of one hundred physicians and twenty boards of health for the year 1895 and a portion of 1896 show 7,021 cases of diphtheria treated by antitoxin, with 704 deaths, a death rate of 10.6 per cent, as compared with 2,936 cases of diphtheria occurring synchronously, with 1,110 deaths, a mortality rate of 39 per cent.

Since these statements were gathered a lower death rate under the use of antitoxin has often been recorded, chiefly through the knowledge that to obtain the best results the serum must be used as early as possible in the development of the disease. The report of the Harper Hospital, Detroit, during the year 1896, shows that there were admitted 112 cases of diphtheria, 12 being subjected to intubation, 6 to tracheotomy, with only 5 deaths, 3 of which were dying when brought to the hospital. In 1897 there were 90 cases of diphtheria in the hospital with 6 deaths. Antitoxin was used both years.

This low death rate led the Detroit board of health* to

* Louisville Medical Journal.

have occurred since 1890. The largest number of deaths from this disease in a single year was in 1892, with 331, while in 1897 there were 130 deaths, showing that at the close of the latter year the epidemic was by no means exhausted. .

Table No. 15 shows the number of deaths from this disease since 1884, by years, sex, and age periods, with totals.

Diagram No. 13 is a remarkably graphic one, showing the eccentric fluctuations of influenza for the period given.

Neither the table nor the diagram illustrates fully, however, the effect of the epidemic at its onset, because its force was largely expended on the sick, the fatal results of which were recorded under other diseases. As an illustration of this assertion attention is called to Diagrams Nos. 1 and 2, under consumption, where the effect of influenza will be seen in the sharp angle of increase under the year 1890, while in pneumonia the number of deaths was increased in 1890 from 582 in the previous year to 703 in the year mentioned.

It is possible that a study of other diseases will also show an increased mortality as a result of epidemic influenza.

As in pneumonia, the greatest mortality from influenza was during the winter months, and also like pneumonia, was exceedingly fatal to infants and the aged.

STATISTICS OF OTHER DISEASES.

In the foregoing we have given some statistics of and briefly considered the chief so-called communicable diseases—diseases against which the means of restriction and prevention are more or less well understood.

Statistics from which similar deductions can be made with respect to mortality in its various phases may be found in the Registration Report, so that any one who wishes to study any particular disease in detail will find therein valuable statistical material relating to every reported disease and other cause of death.

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All the principal summer hotels have a watchman on duty nights, and watchman's electric clocks are in use to show the care and efficiency of the servants when on duty.

As most of these houses have a hydrant service, with a large water-supply, they might, with very little trouble, organize a fire brigade, having a competent chief that, with weekly drill, would at once inspire confidence on the part of the guests and insurance companies.

The railroad has been extended from Jefferson Meadows on the main line, by a branch to within a few rods of the Waumbek. In this connection, and in justice to the two great railway corporations that furnish transportation for the many thousand people that visit Northern New Hampshire, it is only proper to add that the management of these lines is fully cognizant of the great value of these mountain resorts to their roads. They believe in further development of our capacity to entertain summer visitors; would be glad to construct new branches of their roads to such points as would develop the business necessary for a return on the investment, and have done a great deal to make their stations and grounds attractive as well as comfortable.

The stations and grounds along the line of the Maine Central reflect much credit upon the management for their forethought in providing designs calculated to bring out the beautiful and the picturesque, and the agents, their families, and the section men, richly deserve the many words of commendation that are so often heard from passengers upon trains passing between Lancaster and Portland.

The Boston & Maine are remodeling and rebuilding stations, giving great attention to the laying out of new grounds, and clearing up roadbed and right of way. It is to be hoped that small margins of trees and shrubs along the banks of rivers and lakes may be ultimately converted into miniature parks. This can easily be done by removing the underbrush from the ground and trimming the trees, thereby allowing the passenger a brief glimpse of the beautiful views which nature has so lavishly bestowed upon New Hampshire.

Respectfully submitted,

GRANVILLE P. CONN, *President.*

AMERICAN PUBLIC HEALTH ASSOCIATION.

REPORT OF THE TWENTY-FIFTH ANNUAL MEETING AT PHILADELPHIA, PA., OCTOBER 26-29, 1897.

BY ROBERT FLETCHER, PH. D., CIVIL ENGINEER, MEMBER OF THE NEW HAMPSHIRE STATE BOARD OF HEALTH, DIRECTOR OF THE THAYER SCHOOL OF CIVIL ENGINEERING, DARTMOUTH COLLEGE.

The twenty-fifth annual meeting of the American Public Health Association was held in Philadelphia in response to an invitation from the mayor. Dr. Benj. Lee, chairman of the local committee of arrangements, remarked that when the association was organized there, twenty-four years ago, it was but a handful; today the infant has grown to the proportions of a giant.

The association has a membership exceeding 1,800, of which a large proportion are in the medical profession; but members of boards of health, civil engineers, professors in leading colleges, sanitary inspectors and other persons interested in the promotion of sanitary science, are gathered from most of the state of the Union, from Canada and Mexico, to consider questions of great importance in relation to the public welfare. A far reaching influence is exerted by the papers presented at the meetings and by the discussions, many of which are widely reported, and all of which are embodied in annual volumes of "proceedings," which now number twenty-two, and which comprise a great body of knowledge and information in various departments of hygiene. This voluntary organization now enjoys so large a measure of public esteem that cities strive for the honor of entertaining it. At this meeting the municipality of Philadelphia gave

them a banquet at which Mayor Warwick presided; the mayor also gave a reception at the city hall; the Woman's Health Protective Association of Philadelphia, the trustees of the University of Pennsylvania, the trustees and faculties of the Jefferson Medical College and Woman's Medical College, and the Academy of Fine Arts, gave entertainments. An excursion was arranged for a trip on the Delaware river and visits to the State Quarantine Station, and the disinfecting plant of the United States Marine Hospital Service. Special privileges and entertainments for the visiting ladies were provided by the prominent clubs and other organizations.

But nothing was allowed to interfere with the business of the association. Fifty-six papers and reports were on the programs and nearly all were read and discussed during the nine sessions held in four days. The aim and scope of this report will permit only the mere mention of the more important titles and summaries or abstracts of some parts of papers which have special interest and value to the people of this state.

At the opening session the resignation of the former secretary, Dr. Irving A. Watson, of Concord, N. H., secretary of the New Hampshire state board of health, was announced. Remarks were made expressing the highest appreciation of Dr. Watson's devotion to and his labors for promoting the interests of the association, and a committee was appointed to draft a resolution expressing the appreciation of the entire association of the splendid services rendered by Dr. Watson and regret at his resignation.

FORMAL OPENING.

The formal opening of the meeting was begun by prayer by the Rev. Dr. W. N. McVickar. Dr. Benjamin Lee, in the absence of Governor Hastings, welcomed the visitors on the part of the commonwealth, and Mayor Warwick extended to them the hospitality of the city. The mayor referred feelingly to the life work of the late Dr. William H. Ford in the cause of municipal sanitation. The annual address of the president, Dr. H. B. Horlbeck, of Charleston, S. C., was then read by that officer.

PRESIDENT HORLBECK'S ADDRESS.

Dr. Horlbeck said in part :

"The association has happily chosen Philadelphia as the place of its meeting, a city which for a century has held the proud distinction of being foremost and best in professional attainments; a city which has always been in the front rank of the noblest aspirations in a calling where the first requirement is an abnegation of personal and selfish consideration, which exacts devotion to the wants of mankind when they become sufferers. Along the century's diapason the great names of Rush, Wood, Chapman, Gross, Leidy, Jackson, Mitchell, and Mutter come down to us in consonant accord with the best and truest ideals of humanity. From these and other great worthies of this city the wisdom of the ages has been given to thousands of our colleagues, who have glorified their teachers by constant self-sacrifice and laborious loyalty to their alma mater. To Philadelphia we are under obligations for the establishment, during the first half of this century, of the best schools of medicine in our country. The lights in the sacred fane of medical lore have been kept constantly bright, and to-day Philadelphia is second to none in her great schools for the propagation of professional medical knowledge."

Referring to the objects of the association, the speaker said that from the earliest dawn of history we learn that the nomads, and later the denizens of cities, exercised care in removing from their surroundings the dangerous accumulations resulting from congregated habitations. From the use of the simplest methods, which gradually increased in scope as modes of living became more complete in character, the highest scientific knowledge is now demanded to meet the requirements of the great cities and peoples of the earth.

IMPROVED METHODS IN COMBATING DISEASE.

Speaking of the progress made in the study of disease, he said that the theories based upon the humors of the blood have given place to a knowledge of the denizens of the blood, which

are being recognized as surely as the flora and fauna of our fields. The microscope gives us the keynotes of our temporal welfare. Quoting from Pasteur :

“Whenever and wherever there is decomposition of organic matter, whether it be in the case of an herb or an oak, or worm, or whale, the work is exclusively done by infinitely small organisms. They are the important, almost the only, agents of universal hygiene; they clear away more quickly than the dogs of Constantinople or the wild beasts of the desert the remains of all that has had life; they protect the living from the dead; they do more if there are still living beings; if, since the hundreds of centuries the world has been inhabited life continues, it is to them we owe it.”

Dr. Horlbeck then gave a history of the organization of the association in 1872, which has grown until there are now 1,844 names enrolled in its membership. During its existence some of the most important discoveries in the domain of medicine and surgery have been made, and the science of bacteriology has had its birth and development. Nearly every one of the score or more of the bacteria that are pathogenic, and that seriously menace human life, have been found and described in the twenty-five years of the existence of the American Public Health Association.

Since the last annual meeting in Buffalo the method of diagnosing typhoid fever, as discovered and described by Widal, of Paris, has been elucidated by Dr. Wyatt Johnson, of Montreal. He has shown that when a drop of blood from a typhoid fever patient is brought in contact with a typhoid fever bouillon culture of the bacillus *typhi abdominalis* there is an agglutination of these bacilli and a cessation of their mobile characterization. This method is now being utilized in a number of cities, and arrangements have been made whereby physicians can send a drop of blood, moist or dry, in a suspected case of typhoid to a bacteriologist, who will in a few hours determine the disease.

During the twenty-five years of the life of the association, the processes of taking care of contagious diseases have entirely changed. It is now an essential feature of the practice in all communities to confine all such cases to the individual affected.

NECESSITY FOR A PURE WATER SUPPLY.

The water supply of all communities is one of the most important matters, and sanitarians will surely be called upon to care for it. Whether the source of supply be shallow or deep wells, cistern or river or lake water, each involves special problems in arranging to free them from polluting causes. Now even the smallest cities are not content without an abundant supply of water for drinking and lavatory purposes and the removal of sewage.

Parkes estimates twelve gallons daily as about the quantity of water required by a man for cooking, potation, ablution and house-washing purposes. London finds thirty-five gallons per capita none too much, and some cities in our country, notably Philadelphia, are furnished with over 200 gallons per capita daily. An abundant, increasing, inexhaustible supply of water carries in its train incalculable possibilities, not only for individual cleanliness, but for the development of industries, which will employ tens of thousands of people who may thus obtain means of occupation for existence, and with good maintenance increase their powers of resistance to disease.

It would seem almost needless to call to the notice of the members of this association the great issues involved in a pure water supply, free from disease producing germs. Diseases which are appalling in their death rate are transmitted principally by water. The most common mode of conveyance of cholera and typhoid fever is by water, and many other diseases are believed to be so transmitted. Greater purity is demanded every year. When the supply is taken from lakes every source of pollution is removed; when taken from a river the problem is more intricate and vexatious, as it involves the prohibition of cities situated farther up from using the river as a dumping place for sewage. Where rivers must be relied on, filtration, mechanical or artificial, must be resorted to, and a daily microscopical and chemical examination of the water should be made to ensure that the water is free from dangerous bacteria or poisonous compounds.

CHANGES IN QUARANTINE METHODS.

The speaker referred to the great change that had been made in the United States in the last twenty-five years in quarantine methods, especially in the shortening of the time of detention, and the methods of disinfection. Detention has been shortened from twenty-five days to fifteen and ten, and in Southern ports, for yellow fever, to five days. This has been largely due to the energy and sagacity of a member of the association, Dr. Joseph Holt, the distinguished ex-president of the Louisiana state board of health, in his efforts to protect the port of New Orleans from yellow fever. Many methods have been in use for disinfecting vessels at the New Orleans quarantine station for the past twenty-five years, among which are filling the holds of the vessel with sulphurous acid gas; raising the temperature to 350° F.; placing textile fabrics in a solution of mercuric chloride. In 1886 a heating chamber was devised to be used in conjunction with mercuric chloride and sulphur fumes, the latter being driven into the holds of vessels by a revolving fan. Many improvements have since been made, and a plant is now in use by which the temperature in the holds of vessels is raised to 230° F., and the personal effects of passengers are disinfected with quickness and certainty and with little injury.

RECOMMENDS A GOVERNMENT COMMISSION ON YELLOW FEVER.

It is estimated that over 95 per cent of all the yellow fever that has reached our shores has come from Havana. A committee of this association has been appointed to bring this vital question before the governments of this country and urge the governments of the countries interested to prompt action in this matter. This would seem to be the occasion when not only the recommendations of our committee on yellow fever should be carried out, but that this body should make a demand on our general government that a commission of expert bacteriologists should be sent to Havana and Rio and be kept there until the *materies morbi* have been discovered, until the secrets of this marvelous disease have been unfolded. The examples of other countries in the



solution of the problems involved in cholera, tuberculosis, bubonic plague, and leprosy, may be noted; why should we not solve the problems of yellow fever? A systematic effort continuously made will be crowned with success. I recommend that a committee from this body be appointed to wait upon the president of the United States to carry out this idea.

The speaker then referred to the progress being made in conquering the great white plague, consumption, in the discovery by Koch of the bacillus tuberculosis. He said there is in every land a profound recognition of the responsibilities of the governing classes, and that a preventable disease should be prevented. He referred to the declaration of the New York board of health, declaring tuberculosis to be an infectious and communicable disease, and providing for detailed reports of all cases of the disease attended by physicians practicing in that city. He commended the action of the board to every sanitarian charged with the protection of the public against the spread of preventable diseases.

Reference was then made to the experiments made by the state board of health of Massachusetts at Lawrence, on the utility of filtration of the water supply with reference to the removal of typhoid germs, the average result being the removal of 98½ per cent. A diminution of 60 per cent in typhoid cases at Lawrence had been the result of filtration. In Memphis, after two destructive epidemics of yellow fever in 1878 and 1879, the introduction of sewers had greatly improved the general health of the city.

In conclusion, he said that in looking over what had been accomplished during the twenty-five years of existence of the American Public Health Association, we have reason for exultation and pride. We bequeath this noble heritage to our successors in this holy work. We transmit to them the light that was handed down to us from our predecessors, and we bespeak in return for this great cause the same loyalty and untiring devotion that we have given to it.

STEAMSHIP AND STEAMBOAT SANITATION.

The first paper presented was a report of the committee on steamship and steamboat sanitation, by Dr. Frederick Montizambert, general superintendent of quarantine of the Dominion of Canada. Dr. Montizambert said in part :

In connection with the relatively shorter voyage of the steamboat, a few points present themselves which it would seem well specially to emphasize. Passengers' bedding—those portions of it which are not regularly laundered, blankets, mattresses and pillows—should be freely exposed to the air and, if possible, to the sunshine after each trip.

The somewhat common usage on inland steamboats of having the dining room on a deck below the water line is not to be commended. Such a position renders proper cleanliness and ventilation more difficult and tends to unwholesomeness.

The holds of steamboats are more likely than those of steamships to become the recipients of the frequent storage of perishable articles of food and freight. They therefore urgently need to be frequently emptied, cleansed, and freshly white-washed.

Your committee cannot allow the opportunity to pass without again referring to the all-important matter of the exposure of the traveling public, on steamboats as elsewhere, to the danger of contracting disease from fellow travellers suffering with consumption, who, in their expectorations, scatter infectious material broadcast. Objectionable and indefensible as it is at all times, with steamboat saloons closed and artificially heated, the expectorator's filthy habit becomes especially dangerous to other passengers. The sputa drying on the decks rises as dust to be inhaled, and to add to the great list of the victims of this fell destroyer of mankind. All spittoons that it may be necessary to provide should contain water or a disinfecting solution, which should be frequently changed.

And it would be well that all states, provinces, and citizens should add to their sanitary codes a prohibition against spitting on the floors and decks of ferry and other steamboats, and

should require all steamboat companies prominently to post in their boats printed notices forbidding this spitting, and to enforce the same. It is a matter doubtless difficult to enforce, but any measure of success therein would be a definite improvement upon existing conditions. And with the advancing education of the general public in the knowledge and belief in the contagiousness of consumption, and the methods to be employed to limit and prevent its spread—to which education such printed notices may be made to contribute—an ever-increasing degree of success may be confidently hoped for.

HOUSE DRAINAGE AND VENTILATION.

The report of the committee on sanitation, with special reference to drainage, plumbing, and ventilation of public and private buildings, by Mr. G. W. Hughes, of Montreal, P. Q., advanced a doctrine at variance with the commonly accepted teaching and practice. This was nothing less than the proposal to abolish all traps, both at the sewer connection and at all minor connections within the house. Reliance would be placed entirely on ventilation by means of the usual main ventilator,—an extension upwards of the main soil pipe,—and to such subsidiary pipes as the details of arrangement in a given case would require, all to be of ample size and carried so high above the roof that nothing would hinder or prevent certainty of action. Every trap is necessarily a depository of filth; traps may, and sometimes do, become partly clogged, hence the usual arrangement of handholes and branches for cleaning; the deposits in them are sources of noxious exhalations, scarcely less offensive and injurious than those directly from the sewer; the best practice, moreover, demands now a special ventilating pipe from the house side of the trap; finally, ordinary traps become unsealed and useless by evaporation after a short period of disuse. The writer also condemned all devices for allowing sewer-air to escape directly into streets, as is usual through the manholes. He would provide for the escape of sewer-gas by the afore-

said house ventilators and by special ventilating pipes carried to the highest available points along the route.

[These suggestions are not new to sanitary engineers. The present accepted practice is recognized as a choice of evils. Undoubtedly any trap, if neglected,—not flushed out frequently,—may become a source of offense, the common condition of sink-traps as used in the ordinary dwelling, without proper care. If the air in the sewers were always warmer than that outside, as in winter, the proposed system of natural ventilation might be fairly effective; but during periods of rapid change of temperature outside and in “heavy,” damp weather, the conditions might be quite unfavorable. Again, since house connections must enter the sewer below the horizontal diameter, special provision must be made in any case for the escape of gases in the upper part. After years of discussion, and costly experiments with forced ventilation, the accepted practice of today is to shut out the sewer-air from houses by traps, so far as possible, and have the ventilation of the house drainage entirely independent. The sewers must have a free outlet, if possible, or ample vent at the outlet, and plenty of openings along the line for free entrance or exit of air; while all sewage must be carried away so speedily, by good grades and abundance of water, that there shall not be time for advanced putrefaction.]

Dr. John L. Leal, health officer of Paterson, N. J., followed with a paper on the “Drainage, Plumbing, and Ventilation of Public and Private Buildings.”

He said in part:

“The importance of the subject cannot be overestimated. One of the results of civilization is that a very large proportion of mankind passes a very large proportion of its time shut up within four walls. Thus situated, mankind is far removed from a state of nature, and must suffer certain consequences due to these acquired conditions. With the advance of civilization these conditions become more and more unlike the primeval condition, and, therefore, more and more harmful.”

In dealing with the question of ventilation, Dr. Leal emphasized these three points: First, that every building intended for occupancy should have some special means of ventilation; second, that these means should be commensurate with the requirements of any particular building; third,

that the more simple and uncomplicated the means used the more successful is likely to be their operation.

"The object of plumbing," Dr. Leal continued, "is, first, immediate withdrawal from a building of certain waste products of life, the presence of which would prove detrimental to health; and second, to prevent harm to the inmates of the said building arising from these products after removal, through the means of their removal. Not only are we threatened by the presence of these substances, but we are also threatened by certain dangers inherent in the best systems at our disposal for ridding ourselves of them."

The remainder of the paper was devoted to describing properly constructed appliances. The subject aroused considerable interest, and was discussed by several members.

Dr. E. A. Abbott, of Philadelphia, was fully in accord with the contents of the paper in the main, but objected to the interpretations of the conditions to the effect that modern teaching on ventilation, as formulated from exact examinations, does not justify the belief that there is present in improperly ventilated houses substances capable of inducing specific diseases, but that the evil results of bad ventilation are principally seen in the personal discomfort to which they give rise.

With regard to plumbing, Dr. Abbott said that unless the plumbing is so defective as to permit of the leakage into the house of actual infective matters contained in the examination, it is impossible by any of the approved scientific methods to demonstrate in the air of otherwise badly plumbed houses matters that can be certainly said to stand in causal relation to disease. The result of experiments on the relation between the gaseous products of decomposition and health have failed to demonstrate that the former stands in any definite causal relation to the latter. Statistics show further, Dr. Abbott said, that the health of workers in sewers, upon drainage fields, and those employed in and about glue factories is, in general, as good as that of the community at large. With regard to the section of the report on drainage Dr. Abbott was in full accord with the views of the writer, and

cited in his discussion of the paper the conspicuous instances in which improvements of a locality had resulted in improvements in the health of that locality.

CAR SANITATION.

The report of the committee on car sanitation, by Prof. S. H. Woodbridge, of the Institute of Technology, Boston, Mass., was then read by deputy; also a paper on the same subject by Dr. Granville P. Conn., president of the state board of health of New Hampshire.

The first report said, in summarizing the question, that something like interstate agitation and regulation are requisite to any legislative advancement in this field of hygienic improvement. For this reason it seems the better way that the movement should originate within, or, at least, be fostered by some strong railway corporation which shall set the pace for other railroads to put themselves in step with eventually.

The second report considered the subject quite comprehensively as to means and methods, and the obligations of railway companies towards the public. Rules to be observed by the trainmen to secure intelligent oversight and management of the ventilation and the suitable appliances provided to secure it were suggested.

General discussion was elicited by this topic. Dr. Hurty, secretary of the Indiana state board of health, gave an interesting account of the work already accomplished in this direction by a large railway corporation, the so-called "Big Four," which has perfected a system for thoroughly cleaning and disinfecting its cars. Cushions are perfectly freed from dust by an air blast working at a pressure of 100 to 125 pounds per square inch. In the cleaning use is made of a 1 per cent solution of formaldehyde; the woodwork is carefully washed and then rubbed with sterilized cloths. This cleaning is usually done after each one hundred mile trip. Besides this a general fumigation of each car is made monthly with formaldehyde gas. Moreover, on each train, a can of formaldehyde solution is kept ready for use in emergencies. Similar meas-

ures are taken, or soon to be used, on the so-called "Clover Leaf," Wabash, and Vandalia lines. The Pennsylvania Company is studying and discussing the question, and is expected to adopt an efficient system of disinfection in the near future.

Professor Fletcher, of the New Hampshire board of health, called attention to the fact that successful ventilation of cars depends upon conditions not amenable to regulations. At sixty miles per hour, a train moves eighty-eight feet per second; at forty-five miles per hour, sixty-six feet per second, and so on. The violent displacement of air in front and the strong suction at the sides and beneath produce drafts and whirlwinds which surround the cars, excepting one or two in front, and raise an enveloping cloud of dust; even coarse sand and fine gravel are stirred and thrown about in the rush. Moreover, unless a good breeze is blowing across the track, the smoke, cinders, and gases from the locomotive generally find the readiest draft and passage along the top and sides of the train. Hence, with all our boasted improvements and luxuries in railway travel, the modern passenger often finds himself, especially if in the rear cars of a train, in an exterior atmosphere akin to that of a great chimney. The more efficient the ventilators, the more speedily the dust, smoke, and coal gases pervade the interior of the cars. No netting or strainers have proved equal to arresting all the dust, while the gases, however diluted, must enter. Until the roadbeds are made dustless, and motors are used which operate without furnaces, the problem of ventilation cannot have a complete solution.

LACK OF PROPER HUMIDITY OF INDOOR ATMOSPHERE.

A valuable and suggestive paper on this topic was presented by Dr. Henry G. Barnes, of Boston, Mass. The author cited figures showing the observed relative humidity in some of the most arid regions of the earth, as in New Mexico, Arizona, Southern California, desert of Sahara, Arabia, etc. His own observations had proved that in houses and office rooms in Boston and vicinity, heated by steam or hot-air furnaces, the

relative humidity is often less than that found in some of the arid regions, *e. g.*, 20 to 25 as against 24 to 35, etc. Results: drying up of and damage to furniture, books, etc.; air uncomfortable and injurious to breathe; thickening of the mucous membrane of the air passages; causation or aggravation of bronchial coughs, and predisposition to attacks of influenza or other infection. The ordinary evaporating pan in a furnace and urn on a stove are utterly inadequate, even if faithfully used, which is seldom the case. In the Bell Telephone building, in Boston, the heated air, before passing up to the rooms, absorbs moisture from a fine spray in a suitable chamber, thus acquiring a healthful amount of moisture. The effect is noteworthy, in comparison with usual conditions, for the air at all times is balmy and refreshing, like that of a June day. Dr. Barnes has devised a simple arrangement for obtaining proper saturation of air, applicable either to the basement coil-box, when indirect radiation is used, or to the ordinary hot-air register. A metal pan, a foot or more long, six inches or more wide, and about six inches deep, is surmounted by a stout wire frame (copper or brass wire, preferably), from which hang successive folds of cotton felting, exposing about ten square feet of total surface for an ordinary living room of 3,000 cubic feet, or less. In a room this is placed inside of a wooden box, of ornamental cabinet wood if desired, having a slatted opening on one entire side for free exit of the warm air. This will have an open bottom if placed over a floor register, or an open side if in front of a wall register. When the pan is kept filled with water the folds of felting, reaching to the bottom, will absorb water as fast as it is evaporated by the passage of the warm air between and around them. A proper relative humidity is from 50 to 55 degrees. All the conditions of health and comfort are greatly improved by breathing air thus treated. An excess of evaporation is indicated by moisture or frost work appearing on a cool window pane; then the proportion should be diminished.

[The present writer, many years ago, finding that evaporation from urns or pans about stoves or furnaces should be measured by many quarts instead of a few pints for an ordinary dwelling,

per day, provided a good-sized pan for the top of a stove and an outside pan on top of a furnace, besides the usual water pan on the inside of the door opening into the hot air chamber. But in many situations Dr. Barnes's plan of exposing a large surface of saturated cloth will secure more uniform results with very little care. The importance of this principle, especially in its application to schoolrooms and hospital wards, cannot be overestimated, and every citizen in our northern climate, responsible for the heating of houses or institutions, should be well informed on the subject, *and act accordingly*. The degree of humidity and its regulation may be attended to in a very simple way. Provide two ordinary thermometers. Around the bulb of one wrap a little wicking, which allow to extend down into a small bottle kept filled with water on a little shelf just below the thermometer, which thus becomes a hygrometer. Hang the other thermometer also near by. The evaporation from the wet wick will cause the reading of the hygrometer to be lower, according to the dryness of the air and the more or less rapid rate of action. Note the *difference* of readings of the two instruments. Then look in the following table for the number on the horizontal line given by the temperature of the room and also in the column headed by the difference just noted.

INDICATIONS OF THE HYGROMETER (DRY AND WET BULB).

Temperature of the air, Fah- renheit.	DIFFERENCE OF TEMPERATURE OR DEGREES OF COLD, WET-BULB THERMOMETER.																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	Degrees of Humidity, Saturation being 100.																								
33°	87	75	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	92	85	78	72	66	60	54	49	44	40	36	33	30	27	...	...	...	...	...	...	...	...	...	...	...
52	93	86	80	74	69	64	59	54	50	46	42	39	36	33	30	27	25	...	...	...	...	...	...	...	...
62	94	88	82	77	72	67	62	58	54	50	47	44	41	38	35	32	30	28	26	21	...	...	...	...	...
72	94	89	84	79	74	69	65	61	57	54	51	48	45	42	39	36	34	32	30	28	26	24	23	22	..
82	95	90	85	80	76	72	68	64	60	57	54	51	48	45	42	40	38	35	33	31	29	27	26	25	..
92	95	90	85	81	77	73	70	66	62	59	56	53	50	47	45	43	41	38	36	34	32	30	28	26	..

For convenience a copy of this table may be posted up near the instruments.

In a recent experience of the writer, the proper humidity was regained in a medium-sized building by placing a galvanized iron

pan, 3 feet long, 2 feet wide, and 4 inches deep, on top of the uncased steam heater in the basement, the door from which was frequently opened or left open; filled with water the evaporation in this case was two inches per day, more or less.]

YELLOW FEVER.

The interesting papers and discussions on yellow fever had little practical value for people of a northern state.

A paper entitled "A Contribution to the Study of Yellow Fever from a Medico-Geographical Point of View," prepared by Dr. Eduardo Licéaga, president of the supreme board of health of Mexico, and Dr. José Ramirez, secretary of that board, said, in part:

"In the port of Vera Cruz, which, as has already been shown by one of us, Dr. Licéaga, can be considered one of the sources in which the yellow fever germ obtains a spontaneous growth, only three cases have appeared during the period under study, and these three cases all came within the month of June. With respect to other points on the Gulf coast, and especially the ports, we can safely assert that during the period covered by this report not a single case of yellow fever has presented itself."

After referring to certain other slight epidemics, the paper continued:

"We once more show the difficulties that are encountered up to the present in establishing an exact diagnosis between yellow fever and certain forms of paludic infection that in hot countries assume a very similar aspect and the serious character that is generally borne by that disease, so much so that even persons who are accustomed to observe the two affections are often uncertain as to the diagnosis. These doubts will in future be dissipated, if, as is to be hoped, the discoveries of Dr. J. Sanarelli are confirmed, who appears to have discovered the yellow fever microbe in the city of Montevideo. A knowledge of the cause of the disease will not only allow us to establish an exact diagnosis, but will also doubtless facilitate the means for attacking it in a certain manner.

"The epidemic of yellow fever that is now prevalent in

some parts of the coast of the United States will give the physicians of these localities an opportunity to study under exceptional cases the efficiency of isolation and disinfection.

"The same epidemic has now presented a phenomenon that is unique up to this date, that our port of Vera Cruz, which three months ago had not suffered from yellow fever, should now be taking serious precautions to avoid contagion from the United States, as at this moment happens, when the steamer Uto is anchored in that port, having arrived from Mobile with three patients, who have been ordered to be held isolated and under observation in the lazaretto of Sacrificio."

Dr. William Bailey, of Louisville, in discussing the paper, said that on August 14 a man came to Louisville from Ocean Springs, where the epidemic is thought to have started, displaying marked symptoms of yellow fever. He subsequently died in a private sanitarium after having shown every symptom of yellow fever. Notice was sent to the authorities at New Orleans, and the latter were advised to investigate the disease at Ocean Springs. This was done, but, in the face of the positive diagnosis of the man who had died at Louisville, the disease at Ocean Springs was decided not to be yellow fever. A week later new cases developed in Ocean Springs, and the epidemic was recognized.

Brig.-Gen. George M. Sternberg, surgeon-general, United States army, referring to the time when Philadelphia was a plague-stricken city, said he supposed that at that time it was a city without paved streets or without sewers. Now, if fifty yellow fever patients were brought to Philadelphia he doubted if an epidemic could be started. He thought he could say the same of New York.

Speaking of the advent of yellow fever in New York several years ago, he said that, although thirteen cases had been introduced there, no new cases had occurred.

"I believe," said the surgeon-general, "that that city which is thoroughly paved and sewered is yellow fever proof. That is our ideal of prevention in the future."

Surgeon-General Sternberg also gave an interesting talk

on the bacillus of yellow fever, with which, in common with Sanarelli, his name is so prominently identified.

TYPHOID FEVER.

The papers and discussions on this subject elicited little of great importance that has not been already well presented in the New Hampshire state reports of the board of health. A very recent result, however, is the emphatic indorsement of the Widal blood reaction in the diagnosis of typhoid fever, as proved by careful tests conducted in the laboratory of the Philadelphia board of health.

FORMALDEHYDE AS A DISINFECTANT.

On this topic the following valuable papers were presented and gave rise to an interesting discussion:

"Report of the Committee on Disinfectants," by Prof. Franklin C. Robinson, professor of chemistry in Bowdoin College, Maine.

"Fumigation Experiments with Formaldehyde," by Professor Severance Burrage, S. B., department of sanitary science, Purdue University, Lafayette, Indiana.

"Determination of the Amount of Formaldehyde Yielded by the Formaldehyde Lamp," by E. A. de Schweinitz, chief of the bio-chemic division of the United States department of agriculture, Washington, D. C.

"Some Experiments with Formaldehyde Gas," by Dr. James F. McShane, health officer of Baltimore, and Dr. William Royal Stokes, bacteriologist of the Baltimore board of health.

Professor Robinson, the inventor of one form of lamp for generating the gas, found that the results under usual conditions are by no means satisfactory. As a general principle, the amount of gas liberated must have a close connection with the time,—an effective time,—of action. Under the best conditions he did not find that the gas would penetrate pillows, cushions, etc.

Professor Severance had tried four kinds of generators, and finds that the claims of the makers of any of the forms of generating apparatus are not yet all realized. Under certain con-

ditions the dry gas will kill all germs, but under ordinary conditions of production and operation hitherto realized the gas has not killed all pathogenic germs. Only the typhoid germ was killed after an exposure of four to six hours. Dr. de Schweinitz found some of the paraform tablets yielded only 50 per cent of the amount claimed for them; that one solution guaranteed to give 10 per cent actually gave $1\frac{1}{2}$; another gave 5 to 6 per cent instead of 50; while a few preparations did yield as much as 10 to 15 per cent, instead of the 40 claimed. The Baltimore experiments showed no good results in less than eight hours under the best conditions. Discussion elicited the fact that the authorities of Chicago and St. Louis have reverted to the use of sulphur and are entirely satisfied, in connection with insistence on exposure to sunlight, fresh air and soap and water.

IN THE BARBER SHOP.

A paper by A. W. Suiter, A. M., M. D., of Herkimer, New York, on the "Barber Shop as a Menace to the Public Health." Dr. Suiter is chairman of the committee on legislation of the Medical Society of the State of New York.

"It seems that the time has arrived," said Dr. Suiter, "when the attention of this association and, through it, that of public health authorities in general, should be called to that part of personal hygiene which applies to the barber shop. It is astonishing that while the sanitary relations of most if not all other public occupations have been investigated to the minutest detail, and salutary restrictions in many instances of the most vigorous character have been imposed to protect the public interest, the first attempt to regulate the operations of the barber shops and to apply to them the rules of sanitary administration has been made within the month just passed. That this common mode of infection should have for so long escaped authoritative attention in these days of asepsis and antisepsis may be noted as one of the most contradictory circumstances of our time." After giving an interesting historical review of the barber, Dr. Suiter continued:

"The first attempt of modern times to regulate sanitarily

the operations of the barber shop was recently made in the city of Paris. As a police regulation, and by direction of the sanitary authorities, an order has been promulgated requiring that specific rules of asepsis and disinfection shall be observed in all shops, for the protection of the public. These directions include the use of only metal combs, in order that they can be easily sterilized, and that, as far as possible, all instruments shall be of metal; that they,—razors, clippers, scissors, combs, etc.,—shall be subjected to a heat of 100 degrees centigrade before and after use; that the shaving brushes must be washed before and after use in boiling water, and the hands of the barbers thoroughly cleansed before passing from one customer to another. They are required to use sterilized towels and pulverizers in place of the common powder puffs, and the hair that is removed is to be disinfected and promptly taken from the room. Chemical solutions are also prescribed for obvious purposes.

“The writer is not informed as to the method by which it will be made certain that these regulations will be faithfully observed, but doubtless a system of inspection will be inaugurated under police surveillance, which will insure detection in case of non-observance and the proper punishment of all offenders.

“As individuals we are constantly reminded of the grave personal dangers which threaten the patrons of the average barber shop, and many of us have long since adopted measures of prevention for self-protection. One evening several years ago, a sheepish-looking individual shuffled his way into my office waiting-room and requested a prescription. He was observed to be suffering from disease, and presented a most unattractive appearance. His face was literally covered with eruptions, and his mouth and lips were ulcerous in high degree with the form of manifestation known as ‘mucous patches.’ His hair was fast falling, and in short he was a perfect focus of infection. His case was disposed of, and he was gladly dismissed. Having to take an early train, I shortly afterward proceeded to the barber shop to prepare for my toilet. My barber’s chair was occupied and I sat down to await

my call. As the occupant was about to arise I was startled to observe the very patient for whom I had prescribed one hour previous. It is needless to state that I took my departure. Then and there I resolved that my face should never again be shaved by a barber. I also adopted a plan for my occasional visits to the barber shop for the trimming of hair and beard, carrying always a packet containing shears, combs, and clippers, and insisting that everything be removed from the chair and clean towels substituted, and that the barber thoroughly wash his hands before proceeding. And for all this I tender him so large a fee (beforehand if he is a stranger) that he cannot complain of what ordinarily seems to him a hardship. The only inconvenience I experience is that among the tonsorial fraternity of my vicinity I am compelled to bear the somewhat unsavory title of the 'Champion Crank of the town.'

"This item of personal observation is introduced only to direct attention to one phase of the many dangerous situations which will readily occur to the sanitary mind, and it seems entirely unnecessary in this presence to attempt to elaborate this simple note of warning and protest by offering illustrative examples. Instances almost without number might be collected and presented to prove the transmission of various diseases by the methods commonly practiced in tonsorial operations. Pages might be written from the scientific standpoint to show the prevalent violation of well-established hygienic principles and the possibilities of parasitic bacteriologic communication. Such an effort should be a work of supererogation, indeed. The assumption is quite warrantable that there is scarcely a step in the processes usually employed by the barber which does not carry an element of danger when the most careful precautions are not observed. In fact, it may well be doubted whether even with such precautions as might be, and sometimes are, made use of in the ordinary way, such articles as combs, brushes, and sponges would still be unclean and capable of conveying vitalized elementary substances from one person to another.

"Take the matter of sponges, for example. No surgeon thinks of using one a second time, unless it is passed through

a process of disinfection, requiring an amount of time and labor which more than covers the cost of a new one; and yet in many, if not most, barber shops the same sponge is repeatedly used from face to face with nothing more than a simple squeezing between each sitter, which cannot remove the infective blood or pus from the often broken or eruptive cuticle.

"In the opinion of the writer is is absolutely impossible—no matter how good may be the intention—properly to cleanse and sterilize any of the instruments employed without consuming an amount of time and material which would render such an effort impracticable. Hence, it appears that nothing short of such compulsory regulations as have been adopted by the Paris authorities would be effective. Local administration of this character should be made to apply to every barber shop, whether rural or urban, and a system of inspection established to enforce the rules. There will be found in many localities some items which the Paris regulations do not seem to cover, such as the particularly dangerous use from patron to patron of the alum stick to stanch the flow of blood from the cut cuticle, the common use of the block of magnesia to complete the drying of the newly shaven man—both of which articles sometimes do continuous service for weeks and months for the occupants of the same chair. Of course, these remarks do not apply to all shops, as many of them are kept as cleanly as possible without scientific disinfection, and most of the better class of barbers would gladly join in the movement for reform if a proper opportunity is offered. It is remarkable that since this information has come to us from abroad the medical journals and newspapers are teeming with commendatory comment, and wonder is often expressed why this subject has been for so long unnoticed.

"Without doubt the people will be quickly educated to the necessity for action, and the efforts of health boards will be supplemented and facilitated by favorable public sentiment."

ANIMAL DISEASES AND ANIMAL FOOD.

D. E. Salmon, D. V. M., chief of the Bureau of Animal Industry, Washington, D. C., reported for the committee on animal diseases and animal food.

"During the past year," the report said, "there have been no outbreaks of disease among the animals of America of unusual extent or manifesting peculiar characteristics. No exotic diseases have been introduced among our live stock within this period, nor have any new problems arisen, so far as your committee is informed, in connection with the protection of the public health from diseases affecting our domesticated animals.

"Nevertheless, there are numerous questions which have confronted practical sanitarians for years, some of which have been discussed at the previous meetings of this association, and which are still debated, misunderstood, and more or less neglected by health authorities. Instead of losing interest as time goes on, some of these questions are becoming more important and more urgent. Your committee can only refer to a few subjects which the events of the year have made particularly prominent." The report discussed anthrax, tuberculosis, and public abattoirs. Speaking of tuberculosis, the paper said: "The problems connected with the control and eradication of this disease among dairy cattle are becoming better understood, and the general plan of procedure outlined by your committee at the Chicago meeting is being largely adopted. That is, the dairymen are being encouraged and influenced in various ways to dispose of their diseased animals and replace them with healthy ones. The boards of health of many cities are requiring more rigid inspection of dairies and compliance with prescribed sanitary regulations by those who produce milk for consumption within the territory under their jurisdiction. In a number of states there are state boards which are especially charged with the duty of controlling tuberculosis. In some, if not all of the New England states, regulations are in force requiring that all dairy cows brought into these states shall have been tested with tuberculin and found free from the disease. Similar regulations are soon to be enforced by the authorities of the state of Pennsylvania."

MEAT INSPECTION.

A paper read by Leonard Pearson, B. S. V., M. D., of the Veterinary Department of the University of Pennsylvania, treated of methods of meat inspection. He said in part :

In this country the existing systems of meat inspection may be divided into two classes, national and local. For some years the United States bureau of animal industry has conducted a constantly improving meat inspection service that now extends to animals killed for export and for interstate trade in the principal meat packing centers of the country.

The work is performed by veterinarians, who examine all carcasses, stamp those that are sound and condemn those that are unfit for food. There is also a microscopical examination of pork for the detection of trichinæ, but this extends only to the products prepared for export. Some of the cities in the United States have also organized more or less complete meat inspection systems. The system in New Orleans, originated and developed principally by Dr. A. S. Wheeler, is perhaps as perfect as exists anywhere in the United States. It provides that all animals killed locally for food shall be inspected and the meat stamped. Moreover, all dressed meat brought into the city must be stamped in a similar way. And it is unlawful for any butcher to sell meat that does not bear the stamp of the meat inspector. In Montgomery all meat-producing animals are killed in a central slaughter-house under the supervision of a meat inspector. These systems and all that are followed in European countries place the responsibility of deciding whether a given carcass is suitable for food upon an inspector who is trained in animal pathology.

In some other cities, as Philadelphia, the meat inspection system is based upon an entirely different principle. There are laws prohibiting the sale of diseased or unwholesome meat, and it is assumed that the butcher is always competent to determine this point. Under this system detectives or police officers are appointed to visit slaughter-houses, markets, and butcher shops, hunt for diseased or unwholesome meat, which is condemned by a veterinary adviser called in by them,

and the seller is often prosecuted. It is scarcely necessary to say that this system is undesirable: 1, because it does not include an inspection of all meat sold and inevitably permits the consumption of much that is injurious, and, 2, because it assumes knowledge on the part of the butcher that he cannot possibly possess, and makes him responsible for conditions that he cannot recognize. The system is therefore incomplete, and as a permanent system it is unjust. Its chief advantage lies in the fact that it tends to make butchers more careful, so that gross pathological conditions do not reach their stalls and a portion of the diseased meat that would otherwise be placed upon the market is barred. However, such a system constitutes a beginning in the right direction, but no municipality should be satisfied with it if a better can be obtained.

Municipal meat inspection is of more importance in the East than in the West, because tuberculosis is more prevalent in this region and a great many worn out dairy cows are sent to the shambles. Many of these cattle are afflicted with tuberculosis and other chronic ailments. They are frequently emaciated and constitute the most dangerous class of beef animals. Philadelphia is situated in the midst of a bountiful dairy district, and is a large consumer of these animals. They are not killed in a large central abattoir, under constant supervision, but in numerous little slaughter-houses scattered throughout the city and its suburbs. There are about 100 slaughter-houses in Philadelphia. Many of these are quite small, situated on back streets, surrounded by stables and dwelling houses. In these establishments cattle are frequently killed at night or very early in the morning and are not inspected at all. Occasionally, and as often as possible, the inspector drops in while the carcasses are being dressed, and his vigilance is rewarded almost daily by the discovery of a diseased and dangerous animal. The business of these slaughter-houses is conducted so irregularly that it is not possible to properly control them without having almost as many meat inspectors as slaughter-houses, and if the force were enlarged to these dimensions the sanitary conditions and

the surroundings of the slaughter-houses would still be such as to seriously injure the wholesomeness and keeping qualities of much of the meat dressed in them.

A further reason for a better system of meat inspection here is that there is a constant and growing demand for many parts of carcasses which are more frequently diseased than the flesh, and were formerly thrown away. Our ever increasing foreign population consumes viscera, for which there was no market a few years ago, and meat inspectors frequently find that such organs are diseased to an extent that renders them unwholesome, while the rest of the carcass can safely be sold. As a result of the fact that inspectors are not constantly present, a great many diseased carcasses are unquestionably sold, and frequently without the knowledge of the butcher who handles them. His training is not sufficient to enable him to detect symptoms and lesions. In some cases, however, he does detect them and remove them so thoroughly that the suspicions of the meat inspector are not aroused.

The conditions that prevail in Philadelphia are not unique. They exist in almost every city in this country, and it is largely on account of the multiplicity of slaughter-houses that thorough systems of meat inspection have not been more generally established. An adequate control of the meat supply of Philadelphia cannot be enforced without a great extension of the present force or a concentration of the business of slaughtering. The latter plan is supported by the experience of all the older civilized countries, and is to be recommended, not only because it would facilitate the inspection of meat, but for several other reasons as well. It would do away with all of the small, poorly equipped, badly managed slaughter-houses, which are in many cases nuisances in their respective neighborhoods. It would make it unnecessary to drive cattle through the streets, a practice that blocks traffic, frightens people, and at times occasions serious accidents. It would give small butchers the advantages enjoyed by wholesalers; they could use the facilities of the large slaughter-house which are immeasurably superior to their individual establishments,

and the cold storage system could be used by all with economy to the dealer and advantage and increased wholesomeness of the meat to the consumer. The offal and the condemned organs and carcasses could be disposed of to better advantage. Local meat would gain in reputation if such a system were enforced, and trade could be built up on its merits, and competition with western beef would be less difficult.

EFFECT OF POOR WINDOW GLASS ON THE EYES.

Dr. Cressy L. Wilbur, registrar of Vital Statistics of the state of Michigan, read the report of the committee on nomenclature of diseases, after which Dr. Edward Jackson, of the Philadelphia Polyclinic, read a paper on "Eye Strain from Poor Window Glass."

Dr. Jackson spoke of the eye strain caused by astigmatism, and manifested through headache and other nervous symptoms, and called attention to the fact that the same effects might be produced in perfect eyes by defects in glass placed before the eye, as window glass. Inequalities of thickness, he said, make such glass act like a lens, and irregularities of refraction may produce the same effect. The bad influence of defective window glass is intensified by the eye having to look through different parts, causing different kinds of strain, so that the eye could not adjust itself so as to work with the best advantage. Even if the defects in the glass are comparatively slight they will, at a certain distance, cause serious strain, similar to that of astigmatism.

Only plate glass, Dr. Jackson said, is free from such defects, and, if very thick, it may also be defective from irregularities in the composition of the glass. The strain from defective window glass is one of the particular causes of car sickness, he claimed, and even though plate glass cannot be used in all windows, it might be adopted in all public conveyances. While some luxuries are harmful, good window glass is one that is altogether beneficial in its effects.

INDIVIDUAL DRINKING CUPS.

A resolution presented by Dr. Howard H. Anders, and referred to the executive committee, was as follows :

"WHEREAS, The common and promiscuous public use of drinking vessels, under existing conditions and well-established hygienic principles, is positively and essentially unclean and insanitary, and therefore a menace to the public health; and

"WHEREAS, During the past three years many churches of various denominations have recognized the need of prophylaxis in administering the communion wine by adopting individual communion cups or chalices, as being cleaner and safer, at the same time not less satisfactory and sacred, as substitutes for the communion cups; be it hereby

"Resolved, That the American Public Health Association, in endorsing the individual communion cup reform, approves cordially the action of the churches, and recommends earnestly the adoption, for sanitary reasons, of individual communion cups wherever communion cups are now in use; and further, be it

"Resolved, That this association recommends still more emphatically and urgently to the public the general use of individual cups, particularly in schools, on railway trains, in stations, at public fountains and the like, as contributory to the better preservation of the public health and the prevention of communicable diseases."

TUBERCULOSIS.

The third day's session was given largely to the consideration of tuberculosis, the program containing no less than five papers dealing with different phases of that subject.

Dr. Peter H. Bryce, secretary of the provincial board of health of Ontario, read a paper in which he emphasized the view that in dealing with tuberculosis it is the duty of the state to do whatever cannot be done so well by the individual.

He was followed by Dr. Samuel W. Abbott, secretary of the state board of health of Massachusetts, whose subject was "Consumption—An Indoor Disease." Dr. Abbott said that no form of infection had been studied with greater interest during the past quarter of a century than that of tuberculosis.

The prominent characteristics of the disease, which he described, might, he said, be considered as accounting mainly for the fact that consumption bore the characteristics of an indoor infection.

"Two persons standing or working at a distance from each other of five or ten feet," he said, "are far more liable to transmit and to receive infection from each other when indoors than in the outdoor air.

"In consequence of the peculiar methods under which tuberculosis is spread from one person to another, from the sick to the well, it is therefore desirable that the most careful attention should be bestowed upon the condition of those persons who are compelled either to live or to work indoors, and that a due measure of the work of boards of health with reference to the restriction of the spread of this disease should be expended in this direction. The danger from the consumption of milk and meat of tuberculous animals has been investigated, and thus far, while the danger to be feared from this cause may be said to have passed from the region of possibility to that of probability, that which may be feared from the diffusion of sputum in inclosed areas or spaces may be said to amount to a certainty."

As proofs that consumption is an indoor disease, Dr. Abbott said he would call attention, first, to the evidence shown by occupations, and secondly, to the evidence presented by the conditions of age and sex. In concluding Dr. Abbott said it must be admitted that tuberculosis is an infectious disease.

"Its character," he said, "is too well defined, both by observation and by experiment, to admit a reasonable doubt. The active principle of infection, the bacillus of tuberculosis, is recognizable; it is capable of isolation from the body, of cultivation and of inoculation into the lower animals. But, practically, the exact mode of infection, when applied to the daily intercourse of human beings, is extremely limited, and no evidence has ever been presented which tends to show that such infection ever occurs by exposure in the open air,

either by the breath of consumptives or by the distribution of sputum upon the surface of the soil. On the other hand, abundant evidence shows that such infection is of very common occurrence from indoor exposure to the distribution of sputum deposited upon floors and dried under favorable circumstances.

"By this I do not mean to infer that the outdoor free distribution of the sputum of consumptives should be encouraged or allowed, but should be prevented on the general principle that filth of all kinds is a nuisance to the sense of sight and of smell, but not because any real danger from such outdoor distribution has actually been shown to exist."

At the close of the morning session the members visited the Medico-Chirurgical College and Hospital, where they were entertained at a luncheon, and were afforded an opportunity of inspecting the splendid new amphitheatre and the various appointments of the institution.

URGENT NEED OF SANATORIA.

The afternoon session opened with the reading of a paper by Dr. S. A. Knopf, of New York, on the urgent need of sanatoria for the consumptive poor of large cities.

The question what to do with the thousands of tuberculous patients who inhabit the tenement districts of our large cities, unconsciously disseminating the germs of their diseases among their own kin, friends, and neighbors, or who crowd the wards of our general hospitals to the detriment and danger of the patients suffering from acute diseases, has become, for the sanitarian, one of the vital issues of the day.

In Europe such men as Von Leyden, of Berlin; Von Schroetter, of Vienna; Graucher and Letulle, of Paris; Weber, of London, and in this country Biggs and Pruden, of New York; Bowditch and Otis, of Boston; Flick, Hinsdale, and Lee, of Philadelphia; Hamilton, of Chicago, and others believe the only solution to be the erection of special sanatoriums, preferably under municipal control.

In Europe the pleadings of the profession for establishments

of this kind have not been in vain. Germany alone can boast of over thirty sanatoriums for the consumptive poor already in working order or in the course of construction, most of them under municipal control. In the United States there are only two or three partly supported by private charity, and not one institution which we may justly call a municipal sanatorium for the consumptive poor. Only recently we of New York and you of Pennsylvania have had the painful experience to see the chief officers of our respective states veto appropriations intended to create institutions which might have become the nucleus of more efficient work than has yet been accomplished in the United States in the extermination of this dread disease. Far be it from me to criticise the action of these distinguished governors, who thought to serve their state best by vetoing an appropriation which seemed to them unnecessary.

To convince them of their error, to convince the many of our fellow practitioners who also deny as yet the need of special institutions for the consumptive poor, to show to the philanthropist a most practical and noble way to do good, not only to the consumptive individual, but indirectly to the whole community, I will ask them all to accompany me for a moment on a little excursion to a crowded tenement district of one of our large cities.

Let them visit there with me some of the consumptive poor who live in these houses, in all the various stages of the disease, from the incipient case of pulmonary tuberculosis to the last hectic stage of consumption, with all its pitiful manifestations of the slow ebbing away of human life.

Let us leave our comfortable homes and enter the narrow streets of those districts, crowded with humanity. We make our way into a house through the little world in rags playing on the sidewalks. We inquire after the patient, and find him lying on a bed or couch in a dark bedroom. We examine him and find him suffering from pulmonary tuberculosis in the last stages. On examining the other members of the family we find one or two of them already "touched" by the deadly

germ. In an audience of sanitarians there is no need to explain how the other members of the family have been infected."

Dr. Knopf explained how one tuberculous individual is capable of transmitting his disease to whole families. The majority of hospitals supported by private charity, he said, refuse admission to consumptives. The speaker described the pitiable condition and insufficient care of the consumptive patient in a general municipal hospital.

The value of isolation may best be shown by the work of St. Joseph's hospital for consumptives, of New York, where the majority of patients admitted are in the last stage of the disease. Dr. Cauldwell, the physician-in-chief, very kindly gave me the following information: This institution receives annually 1,500 consumptives, at an average daily expense of about fifty cents per patient. Dr. Cauldwell does not claim to be able to do more than care for them under existing circumstances, although a goodly number are discharged able to work again. But leaving aside the curative results, St. Joseph's hospital, by taking care of 1,500 patients coming from among the poorest classes, suppresses annually 1,500 foci of infection. How many lives may not thus be saved indirectly?

Of course at Liberty, Saranac Lake, and Sharon, in view of the fact that these institutions are only intended for incipient cases, the curative results are much more favorable. Thus Dr. Trudeau could report from 30 to 35 per cent of cures with an average stay of eleven months ten days. This shows very great importance of early diagnosis. At the Liberty sanatorium, of the patients who remained over three months in the institution 50 per cent were improved, and about 25 per cent cured. With those who stayed a shorter period the results were less favorable.

But aside from the considerable number of cures which can be effected in a sanatorium for consumptives, especially when the hygienic and dietetic treatment, under constant medical supervision, is strictly adhered to, there are other sanitary advantages of inestimable value which a community could

derive from the creation of one or several sanatoriums for the consumptive poor. In a perfectly conducted sanatorium, where the curable cases are cured and the hopeless cases cared for, so that it is impossible for them to propagate the disease, all patients receive a hygienic education, so as to understand why they should only expectorate in a proper receptacle, what they should do or not do to avoid new colds, why it would be unwise for them to marry as long as they are not perfectly cured, etc., etc. When the patient who has passed through such a sanatorium returns to his home cured or only improved, he will become an educational factor in public hygiene. He will not only have learned to avoid the causes which may aggravate his condition, but he will still use his pocket spittoon and tell his friends that he uses it to protect them from any possibility of getting the disease through him, and, at the same time, he will know that through such precaution he also protects himself from reinfection.

When the worthy but poor consumptive is taken in time to an institution where his chances for recovery are still good, he will have little chance to infect the other members of the family, and he is likely to return, after a relatively short sojourn, restored to health and hygienically educated, ready to become again a bread-winner and supporter of his family. Now, the maintenance of this patient in a municipal sanatorium for from three to six months, or even longer, during the earlier stage of the disease, will cost the commonwealth no more than if he had been taken to the general hospital for, perhaps, the same period of time, but at a much further advanced and more hopeless state of his disease. If the family were absolutely destitute, the members would have to be supported by the municipality, whether the head of the family were in the sanatorium or general hospital. But since, when treated in time and in a special institution, he has 25 or 35 per cent more chance of getting well, the likelihood of the community being obliged to support a widow and several orphans has thus also been reduced by nearly one third.

Dr. Knopf described what he called an ideal plan of how to

proceed to select the proper cases for treatment in such institution, how to avoid unnecessary expenditure on the part of the city government, and, lastly, how to avoid admitting to free treatment patients able to pay. In closing, Dr. Knopf said :

“Our prophylactic measures, no matter how strict, will not suffice to do away with the centers of infection, daily created anew in our tenement districts. To prevent the hopeless cases from communicating the disease to the large number of susceptible individuals with whom they will come in contact, to give the tuberculous patient yet in the early stages of the disease, but with little or no means, the best possible chance of becoming a well man and a useful citizen, we need municipal sanatoriums. Let physicians, statesmen, and philanthropists unite to further the creation of such institutions, for through them I think we will not only alleviate much suffering, but will solve one of the most important and difficult problems in medical and social science.”

The two other papers on the program were : “Bovine Tuberculosis in Its Relation to the Public Health,” by Dr. D. H. Bergey, first assistant in the laboratory of hygiene, University of Pennsylvania, and “Tuberculosis and Milk Supply,” by Dr. Mazyck P. Ravenel, Bacteriologist to the state live stock sanitary board.

Dr. Ravenel quoted from many authorities, showing that tuberculosis, as seen in children, starts in a great majority of cases in the intestines. He held it would be reasonable to suppose that the disease came from the children’s food, namely, milk. He quoted other authorities, citing cases in which milk was the source of infection, and still others, in which the tubercle bacillus had been found microscopically in milk. Again, he showed that the disease had been produced by feeding milk to lower animals, and that the disease in the lower animals and in man were one and the same. Dr. Ravenel told of experiments which he had made on 154 guinea pigs. Omitting those animals which had died too soon to show symptoms of the disease and those used to control other experiments, he said, 15.4 per cent developed tuberculosis from one

single dose of milk derived from cows known to be tuberculous. It was not necessary that the udders of cows should be diseased, he said, for them to give tuberculous milk, and the only way to avoid drinking tuberculous milk was to examine the herds. The latter was an absolutely certain test for detection of even incipient cases. He urged the importance of the slaughter of all animals known to be tuberculous, or at least their removal from the herd. Special care should be taken to avoid using milk for infants from even suspected cows. If necessary to use suspected milk it should be pasteurized or boiled.

An interesting discussion followed the reading of the papers. Dr. Lawrence F. Flick, of Philadelphia, said in part :

This very important subject cannot be too much discussed. We all agree that the disease is preventable, and that the two most prolific sources of contracting it are through the sputum, and from domestic cattle.

He did not accept the idea that infection was so much conveyed through milk, Dr. Flick said. Out of an extensive experience he had not seen the first well-established case. He called attention to the close clinical relation between persons in the same family. Cases where children contracted tuberculosis usually occurred, he said, in the same house where their parents having the disease resided, and, therefore, only by the establishment of special hospitals could the diseased persons be removed from the family center. Wherever cases had been taken from the family circle there had been a reduction in tuberculosis. No hope of accomplishing great results could be looked for until the public was educated on the subject of the infectiousness of the disease. This education was going on, however, Dr. Flick said, and in Philadelphia in the last ten years there had been a reduction of the disease by one third.

"In Pennsylvania," he said, "we are trying to educate the people to get a hospital, and in twenty-five years we will succeed in practically stamping out the disease here."

Dr. Lydia Rabinowitsch, of the Woman's Medical College,

who is not a member of the association, was accorded the privilege of taking part in the discussion. She told of experiments which she had made in the past two years with butter and milk. Of the samples of milk examined, she found from 20 to 30 per cent to contain tubercle bacilli. In eighteen samples of butter from different stores she had not found one bacillus of tuberculosis, but had found a micro-organism which resembled very much the bacillus of tuberculosis.

THE QUESTION OF WATER.

Water was the subject of the papers which followed. F. H. Newell, hydrographer of the United States Geological Survey, Washington, D. C., on "Investigations of Water Supply by the United States Geological Survey," told of the thorough examination of the geologic structure, mineral resources, and products of the United States in which the geological survey is engaged. In closing he said:

"It has been demonstrated again and again that purification of sewage by filtration or by irrigation is practicable and can be conducted at reasonable expenditure, and it is to be hoped that the time is rapidly approaching when public sentiment will be aroused to the degree of compelling such filtration whenever public health and comfort are imperiled. Toward awakening such public sentiment the division of hydrography of the geological survey, is trying to do its part by presenting definite facts clearly and impartially, and showing what are the character and limitations of the natural water supplies, and how these may be utilized and protected."

"A Brief Review of the Work of the Sand-Filters at Lawrence, Mass.," by H. W. Clark, chemist in charge of the Lawrence experiment station. The last named said, in part:

"Lawrence is a New England manufacturing city, situated upon the Merrimack river, and with a population at the present time of about 50,000. Up to 1875 the water of the city, used for all domestic purposes, was obtained from ordinary wells. In that year, however, a public water supply system was constructed, and the water pumped to the reservoir and distributed to the citizens was taken from the river at a point about one mile above the city.

"Nine miles up the river from the intake of the new system was the city of Lowell, at that time having a population about the same as Lawrence today, but now containing about 85,000 people. The sewage of Lowell was then, and is now, discharged into the river, and above Lowell are other cities and towns also discharging their sewage into the river and its tributaries.

"This water supplied to the people of Lawrence by this system was, then, from the beginning, badly polluted, but was evidently purer than the average well water previously used, as shown by a considerable decrease in the death rate of the city following its introduction.

"Gradually, however, typhoid fever became more and more prevalent, and finally the death rate in the city from this disease became the highest in the state, being about three times as great per 10,000 inhabitants as the average city in the state."

Mr. Clark said that the cause of the epidemics of typhoid fever, which visited the city during months of the year when other cities of the state were comparatively free from this disease, was the polluted water supply, and the question of a new supply began to be agitated. In the meantime, investigations in regard to the purification of Merrimack river water by sand filtration had been carried on at the Lawrence experiment station of the state board of health, and had resulted so satisfactorily that as early as 1891 the city was advised to construct a sand filter large enough to filter its entire water supply, and in 1892 the city government made an appropriation for beginning its construction under the state board of health.

"In the January following the starting of the filter the number of cases of typhoid fever was nine, or one eighth as many as during the previous January. This fact is more striking when we note that in Lowell during this month there were ninety-nine cases, or three times as many as during the previous January. In January, 1895, there were ten cases in Lawrence; in January, 1896, six cases, and in January, 1897, two cases.

"A more satisfactory demonstration of the effect of the filter upon the health of the people of Lawrence can be made, however, by stating that in 1887 the deaths from typhoid fever were 12.00 per 10,000; in 1889, 13.75; in 1890, 13.33; in 1891, 12.20; and in 1892, 11.11. During 1893 the filter was built, and hence during a portion of the year filtered water was being used. In 1894, however, filtered water was in use during the entire year, and the death rate from typhoid fever was 5.00 per 10,000; during 1895 it was 3.07; during 1896, 1.86, and the rate for the present year promises to be exactly the same as for 1896.

"Besides giving a water free from disease germs, the filter is also giving a cleaner water, one more attractive and palatable, and containing but 50 per cent of the organic matter of the river water."

Today's sessions will be held at the University of Pennsylvania, where the members of the association will be entertained at a luncheon.

A NATIONAL DEPARTMENT OF HEALTH.

The report of the committee on health legislation contained a proposed bill to establish a department of public health, the latter to be under the control and management of a commissioner of public health, who shall be a regularly educated physician, appointed by the president of the United States, and whose term of office shall be six years.

That part of the final report of the executive committee which recommended favorable action by the association on the proposition elicited considerable discussion before it was adopted.

The resolution which prevailed was as follows:

"*Resolved*, That this association reaffirms its urgent opinion, and petitions the congress of the United States to organize and establish a national department of health.

"*Resolved*, That this association transmit to congress a copy of the report of the committee on health legislation, with the accompanying papers."

TRANSPORTATION OF THE DEAD.

The report of the committee on the transportation and disposition of the dead was read by Dr. Probst, secretary of the state board of health of Ohio. Among other things this report favored the preparation of bodies for shipment by a licensed embalmer. Dr. Henry, of Asbury Park, objected to this on the ground that it sought to create a special class of workers, to whom all the business would be restricted. He offered a motion, which was carried, that the report be adopted, but that the words "by licensed embalmer" be stricken out, and "under supervision of the provincial or state sanitary authorities," be substituted.

WOMEN'S HEALTH PROTECTIVE ASSOCIATIONS

And their relation to the public health was ably presented by Mrs. John H. Scribner, president of the Woman's Health Protective Association of Philadelphia. The great interest in this address was due not alone to the personality of the speaker, but also to the organization for which she spoke. In only four years of existence this association of earnest, well-informed and public spirited women has become a great force for the betterment of many conditions and interests of their fair city.

The object of the association is to promote the health of the city by study of sanitary and hygienic conditions, and by active co-operation with the municipal authorities.

A committee on contagious diseases is moving vigorously for the establishment of a hospital for people having contagious diseases, who have means to pay their expenses, where they can remain until they recover without menace to the lives and health of their families and the community.

A committee on street cleaning has moved the officials to more effective action for the proper removal and disposal of ashes and garbage; has procured the better drainage and paving of certain streets and alleys, and has been actively at work in various ways to lessen the habit of spitting in public buildings, market houses, and on the sidewalks.

The committee on water supply, at the request of the citizens' committee, visited the experimental filters erected by three different companies in Louisville, and were convinced that grave dangers to health would result from the use of alum as a coagulant, in the quantities necessary for cleansing the water of Philadelphia. They therefore called in Mr. Allen Hazen as an expert, who spent several weeks in examining the water-works of the city and developed a plan for sand filtration. This report was presented to the mayor for the use of the city, and has been widely quoted.

The trolley committee devoted itself to efforts to secure better protection to the motormen from the weather, the abatement of expectoration in the street cars, and the better heating and ventilation of the cars.

The schoolhouse committee visited and thoroughly inspected 163 buildings during one winter. They also called to their assistance Professor Woodbridge of the Massachusetts Institute of Technology, a recognized expert on the sanitary condition of public buildings, who inspected thirty-two representative buildings of various types. In many cases they found conditions most unhealthy and dangerous, with consequent sickness among the pupils, and by reports and agitation strove to arouse the parents and authorities to a sense of the need of immediate action to secure decent accommodations for the children. Special attention was called to eighteen buildings or rooms (mostly rented) positively injurious and utterly unsuited for school purposes.

The down town branch secured recreation piers on the river for the use of the poor, waged war upon the piggeries, agitated for a free public bath house, for free drinking places, and for wash rooms in the schools, and organized a Children's Clean City League.

The bakeshop committee met the executive board of Journeyman Bakers and discussed plans for the improvement of the condition of the journeymen, for an investigation of bake-shops, and to urge one day of rest for employees. "The reports rendered were almost incredible, and proved the neces-

sity for a thorough revolution and renovation in bakeshop history."

"Twenty-two shops were visited, with interesting results. A few of them were clean, and in consideration of the pressing inconveniences upon the occupants of those places, they were to be highly commended. Our investigations were made by night, during the working hours, mostly in the slum districts; we found most of them unclean, and the only light, gaslight, which fast consumed the pure oxygen. We descended into disease-breeding atmospheres, breathing foul odors from closets, drains, and gutters, and saw the bread prepared that would next morning be on the tables of many fastidious but thoughtless customers."

The daily press took up the question, conferences and public meetings were held, and a bill was presented to the legislature in February, 1897, to "Regulate the Manufacture of Flour and Meal Food Products and Providing for Sanitary and Clean Bakeshops."

A playground committee agitated for the more effective use of the parks by better permissive regulations for the children.

Finally, a literature committee and an entertainment committee attended judiciously to their appropriate work.

The fourth annual report shows a membership of nearly 400 women, and endeavor will be made to have it 1,000 or more. Money received during the last year, \$5,548; expenses, \$3,284.

Similar organizations are doing effective work in several of the leading cities of the United States, and there is ample opportunity as well as urgent need for active interest and labor by the women in both large and small communities all over the land. Many of the evils to be remedied affect directly and intimately the children and the home. Women of intelligence, with time to spare, have here a field of noble activity, in doing away with ignorance and prejudice, educating the people in sanitation, and stirring up the proper authorities *to give attention to all conditions affecting the public health and to take timely action.*

DISPOSAL OF GARBAGE AND REFUSE.

From the standpoint of the sanitary engineer, one of the most important papers presented was the report of the committee on disposal of garbage and refuse, prepared by the chairman, Rudolph Hering, civil engineer, of New York. The report contains a vast amount of information regarding both American and European practice in garbage disposal. Only the conclusions were read by Mr. Hering, and even this is so long and of such a character that a brief abstract cannot readily be made.* The writer said in part :

The present and final report is to a certain extent supplementary to the previous reports, but it contains all the conclusions which have heretofore been stated. The Appendix contains the replies to circulars from over 150 American and Canadian cities, which constitutes a valuable mass of information concerning the status of the question in this country. It also contains description of the most important methods of disposal in detail, and of receptacles, carts, wagons, etc., which appear to have given fair satisfaction. It finally contains descriptions of the best European practice and the results thereof.

After defining garbage and stating the difficulties of this very complex sanitary problem, the report treated, in order, of collection and removal, character and composition, and then at length of final disposal, (*a*) by individuals, (*b*) by communities. Under the last head the author treated "separate removal" in all aspects. We quote one paragraph:

"The fact that domestic garbage contains a fair percentage of grease, and that the remaining material may be converted into a fertilizer, has caused the development of processes in this country for converting garbage into these two materials to be sold at a profit. The works which must be erected for this treatment of garbage can only be profitable if large quantities are handled. Such works have been erected in a num-

* For the summary of the full report see "Engineering News" for Nov. 4, and "Engineering Record" for Nov. 6, 1897; both published in New York City. A full illustrated description of the disposal works at Hamburg, Germany, may be found in "Engineering Record" for Oct. 23, 1897.

ber of cities in the United States. Companies were formed and the work was undertaken with the expectation of conducting a very profitable business. Experience has demonstrated, however, that in many instances there was no profit and that in others it was small. It has heretofore been impracticable to conduct the works so that a nuisance would be wholly prevented, and it was, therefore, found best to locate them at points where an occasional nuisance would not be objectionable. After several years of operation a number of these works have been abandoned because, under the necessary sanitary restrictions, they were not found to be remunerative."

"Your committee feels compelled to state, with reference to the disposal of these materials, that a separation does not seem to be economical or advisable, unless the conversion of garbage into salable products is an assured profitable business. It has not been so found in the larger cities of Europe, and separation is not there practiced.

"(b) Combined Removal.—When no separation is made of the various waste materials, and all are collected together, there is, in the opinion of your committee, but one way in which the final disposal should be accomplished; namely, by cremation. This is the system successfully adopted under these circumstances in many cities of Europe, and it is growing in favor every year. (See statistics in Appendix.) In England the burning of city garbage and refuse has been practiced in some cities for half a century. Considerable experience has, therefore, been gained regarding the most suitable construction of the furnaces and the manipulation of the material.

"Within the last two years, extensive experiments have been made in the cities of Hamburg and Berlin on the subject of garbage and refuse cremation, as already stated. The results there obtained with garbage that contains less combustible matter than the English, and still less than the American garbage and refuse, indicates without any doubt that a destruction of this material by fire can be an economical process,

besides offering a thoroughly sanitary solution of the garbage question."

In discussing Mr. Hering's reports Mrs. Scribner thought that not enough stress had been laid upon the value of the reduction process of garbage disposal. She said that when cremation alone was practiced in Philadelphia, the collection by the garbage contractors was not satisfactory, but with reduction the collection had been better, because salable products resulted from this process. She also thought that garbage disposal plants should be in the hands of the city, so that if any profit results the city may have it.

Mr. Crosby Gray, president of the board of health of Pittsburgh, stated that some two years ago a garbage reduction system was put in operation in that city. (See Engineering News, October 3, 1895.) During the first year the plant proved to be very objectionable, but improvements have been made so that during the past year, or less, the offensive odors from the process and the product had been greatly reduced. He thought they would soon be entirely obliterated.

Dr. Ernest Wende, health commissioner of Buffalo, stated that the Arnold system of garbage reduction had been in use there for five years, and is now giving satisfaction.

In closing the discussion, Mr. Hering stated that the committee does not wish to condemn reduction. It has no objection to the process where it is not a nuisance and the cost is not prohibitory. He also called attention to the fact that reduction disposes of only a part of the refuse of a city. The cost of handling the balance should be added to the cost of reduction when comparing this with cremation.

THE PUBLIC HEALTH.—PUBLIC RIGHTS V. PERSONAL LIBERTY IN HEALTH AFFAIRS.*

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HEALTH.

Boards of health are unpopular. As a part of the executive power of the government they are included in the department of police, and we are aware that the guardians of law and order do not enjoy the entire confidence and good will of all sorts of people.

Local boards of health find that some of their most conscientious and praiseworthy efforts for the public welfare are met by prejudice, opposition,—even to open resistance in extreme cases,—and not seldom by unjust personal resentment against the individual member.

Happily, such a situation is not universal, for there are in this state not a few progressive communities where sanitary science is understood in good degree, and where intelligent majorities have secured proper sanitary conditions, or are making a good beginning.

Even the state board of health, whose functions are of such a general advisory and educational nature that there is much less direct contact with individual interests, is too little valued. The people's representatives in the legislature have sometimes betrayed the popular misjudgment,—assuming an attitude, on more than one occasion, apparently of mere good-natured toleration, perhaps hardly appreciating at its true value the past and present work of the board. If there were a better acquaintance with the fourteen published volumes of the reports of the state board, even the most unappreciative individual must admit that the state pays a small price for what it receives. The cost would be moderate even for the

* Read before the N. H. Association of Boards of Health.

more strictly clerical work in the collection and arrangement of vital statistics, and in the performance of other duties imposed by law, which are only indirectly related to sanitation. Moreover, the wide range of valuable information, closely related to the life and health of the people in many ways, which these reports also contain, should command the attention and consideration of all well-informed citizens.

The popular feeling we are noticing may be characterized as one of impatience; at what too many,—even among our own friends and neighbors,—look upon as meddlesome interference with private rights. Better informed people perceive that much of this feeling springs from ignorance, usually partial, but sometimes complete, of what is now well-established sanitary science. If this constituency, which contends for personal liberty in such matters, could send us a representative to express their sentiments, he might compress some of their most extreme, as well as some of the more moderate views, into the following monologue:

“My house is my castle. My premises are not to be invaded without warrant. Anybody who noses about my build-ings is a trespasser. If my ways don’t suit other people they have no occasion to meddle. What if my well is surrounded by my barnyard, and pigsties, and privy? The water is clear and suits me. My father and grandfather drank it and lived to be old men. As for the kitchen slops, a short spout from the sink into the garden just behind is quite sufficient. The dooryard is sometimes a little more handy, and my mother and her mother before her found such arrangements good enough. Ditching and laying drain-pipe cost money and take time.

“Do I clean out my barnyard more than once or twice a year? What is a barnyard for if not to collect solid and liquid manure? Mine is as good as the average. I clean it out when the manure is wanted. I can’t afford to drain and compost the liquid and keep things dry all the time. Such fussing may do for a gentleman farmer who can hire more help than I can.

“Who says my cow-stable is unhealthy? Who talks about

no ventilation and one end being as dark as a pocket? There are two or three small windows at the south end. There were windows on the other sides but the glass got broken, and it was cheaper to board up than to set new glass. Besides, the modern idea is that cows must be kept warm, and boards are warmer than glass. Our grandfathers are blamed for having too much ventilation, because they left open wide cracks between the boards, which let in wind and snow on to the cattle. We think enough fresh air comes in by the doorway, and, if we keep the barn fairly warm, ventilation must take care of itself.

"You object to cartloads of dung piled behind the stall, and the mire a foot deep? Do you suppose we can carry out the stuff every day? I calculate to clean out about once a month in the winter time. Of course a shut-up cow-stable gets to be a leetle strong, but we get used to it. Cows always have stood it and they always will.

"Are the udders ever cleaned before milking? Not so very often of course. Would you treat a cow like a baby? You have to take cows as they are naturally. Our hands can't be kept lily white either,—but they are cleaner than the cows. Of course a little dirt gets into the milk,—a few specks, but we usually strain it. A little cow dung don't hurt a body.

"What is the effect of all this on the milk, and what do the customers think of it? Well, they are too particular. These health fellers are putting notions into their head. They talk about milk absorbing stable odors, and getting infected with microbes, and so on. They want dairymen to have cemented floors, and whitewash the stables, and give the cows a bath every day, and wear white aprons when they milk, and, maybe, sterilize the milk. We have heard of such dairies, run by cranks most likely, but how is a poor farmer going to make any money in the milk business if he has to put on all that style?

"And now comes all this talk about sputa. Do they expect to keep people from spitting? What is a man going to do if he has the grip or consumption, and a raising cough? The barn floor isn't any too good for me to spit on, and I guess the store floor, or the street car, or sidewalk aren't any better.

"What is going to happen when mill-owners have to fight for the rights and privileges which they have always had heretofore? Why should anybody try to stop the turning of sawdust, and shavings, and chemicals, and wool-washings, and so forth into a stream or pond? Or the keeping of a privy over the water if that is convenient? The law gives a right to natural drainage. Why should an owner go to great expense to get rid of waste because people down stream think the water is being contaminated? Let such a community do the filtering and the cremating themselves; they can afford to better than an individual. They used to tell us that a running stream purifies itself; let the folks below take their chances.

"If any of my family are down with measles, or scarlet fever, or diphtheria, why should my house be placarded as though we had the black plague? That adds insult to injury. We know enough to take care of our sick, with the doctor's advice, and to warn off the neighbors, when that's necessary, which it isn't always, for even doctors sometimes give a false alarm. I tell you it is too much meddling. And then, after all, to be ordered to burn up the children's books and playthings, and re-paper and re-paint the sick room, and to fumigate and turn the house inside out, it's more than a man of small means and some independence can stand.

"Then, again, this craze about tuberculin tests is turning some folks' heads, and they want to kill off the cattle if they think they find a few microbes somewhere about them. They want to inspect all the hogs for fear of trichinæ. They find fault with the stock business of the railroads because the cattle have to stand up in the cars and don't get much to eat or drink, and get to market more than half dead after traveling a thousand miles, more or less. They think that a butcher who has to pick up his cattle anywhere in the country, and buy them good, bad, or indifferent, ought to feed the public with fatted calves and make the price very low at that. Other parties are trying to take away from the people the freedom of certain ponds for bathing, boating, and fishing. Of course

they will have to stop the skating, too, unless they can get skaters to sign a pledge not to expectorate. Why, if these sanitary folks and the Society for the Prevention of Cruelty to Animals could make the laws to suit them the little liberty left to us would be too highly respectable for the average man."

While no one man is likely to hold all of the above sentiments, yet from the talk and actions of many whom we meet, we are left in no doubt about these and other grievances which our liberty-loving friends have against the "sanitary cranks." We can sympathize with them somewhat from their standpoint. But they need to take another point of view, where they can see a few facts which will set them to thinking in another direction. For "are they not all honorable men" and mostly level-headed? Perhaps they have forgotten that the divine law of Moses included a police regulation which virtually forbade a privy within camp limits. In Deut. xxiii: 12-14, the motive for this is thus stated:

"For the Lord thy God walketh in the midst of the camp to deliver thee, and to give up thine enemies before thee; therefore shall thy camp be holy: that he see no unclean thing in thee and turn away from thee."

That is to say, the cleanliness of the surroundings of the entire body politic, or nation, was a condition of the divine blessing, and personal decency had an immediate relation to the public weal. That was three thousand years ago, and, as a principle, it cannot be less true in the far wider world of today.

It is a pity to rehearse elementary facts, but our unconverted friends must have a fairly full statement in order to know just where they are today.

1. Water Supply.—One (Prof. E. J. Bartlett on "Potable Water," reports of the New Hampshire state board of health, Vol. 13, p. 196) has truly said that "a well is a hole in the ground." Under usual conditions it receives the subsoil water of the surrounding country and the leakings of the soil near by; the latter is generally polluted and commonly quite foul, whether in town or country. Such soil has little proper

filtering power; only clean sand filters with best effect. Experiments at Lawrence proved that even clean garden earth has but small and sluggish action to purify dirty water. Sad experience in hundreds of recorded cases, and thousands unpublished, proves the average well-water to be the cause of debility, low fevers, and other sickness, even when not poisoned by typhoid or other of the more dreaded disease germs. The glamour about the old family well must give place to a sense of danger, and the song of the "Old Oaken Bucket" be esteemed as sentimental rubbish.

Rain-water collected in a cemented cistern may be safer if the cistern is clean and has a proper filter. Among the hills farmers may have, as many do, pure spring water; in the lowlands deep artesian borings usually yield the best of water. Wide awake communities are now alive to the question of supply by public water-works. The last volume issued by the state board of health gives reports on the water-supply of sixty-five towns in this state. The "Manual of American Water-Works" just published by the Engineering News Publishing Company, of New York, shows that there are in New Hampshire seventy-one towns having full or partial supplies, and two projected works. Of these, sixty-two have a full supply for domestic use and fire protection. There are fifty-three separate works, twenty-four owned by the public, twenty-seven by private parties, and two jointly. Some remarks of the editor of this most valuable manual are just to the point here. He says:

"Much has been written of late regarding changes in the standard of living, the growth of urban population, and the rapid increase in municipal expenditures. Of the many phases of the subject, one that has but little consideration from the general student of social problems is the growth of water-works plants in number and efficiency. Considering only the number of works it may be noted that at the beginning of this century there were practically no water-works in the United States or Canada, whereas there are now nearly 3,350 complete works in the two countries, supplying more

than that number of towns, of which about 2,780 have been built so recently as since 1880, and some 1,400 in the past six years.

"Think of the effect upon the standard of living caused by the introduction of a public water-supply! In place of the labor attendant upon lifting water by the old oaken bucket, the more prosaic hand pump, or of carrying in pails from some spring or stream, only a turn of the faucet is now necessary in hundreds of communities, to secure either hot or cold water on one or more floors of a dwelling. The labor saving thus secured, together with the increase in convenience, comfort, and cleanliness, is too evident to need detailed mention, especially as both the old and the new are within the experience of so many. Neither is it necessary more than to refer to the other benefits of public water supplies, such as fire protection, street sprinkling, and water motors for household, business, and light manufacturing purposes. Altogether, the ideas which these few words will suggest, coupled with the large number of villages, towns, and cities supplied with water-works in recent years, are sufficient to impress one with the immense change in the standard of living and customs and habits of a vast portion of our population wrought by this one improvement.

"Perhaps a word should be said regarding the effect of so many public water supplies upon the health of the countries in question. In most cases the introduction of running water by the municipality or some private company means the abandonment of badly polluted surface wells, previously the only available source of supply. Exhaustive studies in Massachusetts and elsewhere have shown conclusively that, with the abandonment of surface wells for pure public water supplies, typhoid fever has decreased to a most marked and gratifying degree. If the general health of a community could be as easily recorded as the typhoid death rate, doubtless it, too, would show notable improvement with every advent of pure to replace impure water."

2. Pestilential Disease.—If our friends will see that their town library is supplied with the publications of the state board of health, and will spend only a little time in reading them, they will learn some startling facts; facts, not theories; facts proved and re-proved, and stamped into the public consciousness of many communities by sad experience of sickness and death.

By way of example consider for a moment the dreaded typhoid fever. Its germ is now well known; it may be seen any day in the laboratory of the bacteriologist only 1-10000 of an inch long and 1-30000 broad; too small for detection by an amateur microscopist, but requires a trained detective and special methods to run it down; but there is no mistake about it; always found in typhoid patients upon examination, and invariably in their dejecta; thousands of deaths have been proved to have been caused by its transmission in drinking water or milk, and traced back to a definite starting point; we cannot weary the well-informed by more than a bare mention of the Lowell and Lawrence epidemics; the St. Johnsbury case, the Windsor case, Chicago in 1892-'93, and others which have served as dreadful examples for our admonition. Careful experiments at Lawrence proved that some, out of a large number of this practically invisible plant, could survive twenty-five days in ice-cold water, during which time it might float over six hundred miles in a stream like the Merrimack river. There may be millions in a tumblerful of perfectly clear water, and they are beyond the reach of chemical analysis.

We might allude in like manner to the bacilli which cause anthrax or malignant carbuncle in animals and men, a germ so persistent that if an animal dead with the infection be simply buried in the ground, other animals eating grass over the grave, even years afterwards, may be smitten; also to the bacillus of tetanus or lockjaw, found in the soil and causing death after getting into the blood through a scratch on the flesh, to the bacillus of diphtheria, to the comma spirillum or bacillus of Asiatic cholera, finally, to the tubercle bacillus, the germ of tuberculosis or consumption, probably the cause of

more lingering illness and death than any other single agency, or perhaps any other two agencies, in the world,—much of which comes every year from thousands of infected cattle, through their meat or milk. Other bacteria which do a very beneficent work in the operations of nature, others which are harmless, and others which are harmful only to lower animals have been studied and described and may be identified by the expert.

This is only a glimpse at a whole body of science which is now available to any inquiring mind. But does not even so brief a rehearsal show a good solid basis for a big body of rights which the public must have, as against the ignorant or careless individual?

As to purity of water supply. Residents on some watershed area may have sickness, infection may be carried, as has so often happened by drainage from their premises, into some pond or stream whence some community draws their water supply. Shall there be no law to protect the larger interests? May not infected premises be watched and the owners compelled, so far as practicable, to disinfect and dispose of waste so as not to spread infection? Vested interests in this state have been able to maintain a right to pollute ponds and streams with sawdust and wastes of the most foul description, regardless of their use for water supply a few miles below. Shall this continue indefinitely? We think not. Massachusetts has taken effective action in this matter to secure the rights of all parties. The city of Worcester, having now a population of nearly 100,000, has been compelled to purify its sewage so as not to make a nuisance in the Blackstone river. Other towns have been compelled to build works to dispose of sewage near at hand. Sources of water supply are carefully watched and defended by their state board of health. England practically set the example in the regulation of sewage disposal so as to wholly prevent or greatly mitigate the pollution of streams. In New Hampshire, it is true, the immediate vicinity of all sources of water supply is protected by a sufficiently stringent law against depositing any injurious substance near

by; we all know, moreover, how ample are the laws against neighborhood nuisances, which give the boards of health sufficient authority and provide penalties which are usually adequate. In the present neglect of the wider field and of the more far-reaching dangers we may see our duty to stimulate public sentiment until our state shall be behind no other in providing all reasonable safeguards against the pollution of its water supplies. Windsor, Vt., had its reservoir infected with typhoid germs, it is claimed, from a source of vile pollution, four miles away on the hills. A fearful epidemic compelled them to wholly abandon that source for drinking water and put in a pumping system at large additional expense. In view of such possibilities can any water-works officials be neglectful, or local boards of health fail to enforce any of the laws already in force, or anybody deny the reasonableness of a larger legal protection?

What are the rights of the public in regard to the milk supply? Let us begin at the cow. A recent writer (see Vol. 14, p. 169, "Reports of N. H. State Board of Health") has pictured the milking process thus:

"Particles of dirt from the hands of the milker, from the teats and udder, and from the sides of the cow fall into the pail. The pail itself may have been washed with impure water, and been imperfectly dried, or the germs may have been floating in the air and settled in the bucket before, during, or after the milking. The stables may have been in a filthy condition and the cows lying in the filth and having it adherent to their udders, drop it into the pail. The hands of the milker are often moistened with the milk to contribute greater ease and facility to the process of milking, and drops of the milk thus used, laden with impurities, if not with filth, get into the milk.

"Then, it often happens in many ways that the milk after it leaves the dairy is infected by the addition of water, and by varying changes of temperature, especially a temperature which greatly favors the rapid multiplication of the bacteria. . . . It has been found in several instances that milk was

infected in the dairy because of sickness in the home of the proprietor or of some of the milkmen."

A vigorous man in the prime of life drank a glass of milk at a railroad station; he was shortly laid low with typhoid fever of a severe type, and in a few days was dead. The disease was soon traced directly to its source at the dairy. Shall such occurrences be possible in all succeeding years?

Unfortunately we cannot secure cleanliness by law; but an aroused public sentiment and a proper attention and watchfulness by consumers would compel dairymen, as a matter of policy, to be, at least, decently clean in the conduct of this business. It is now well proved that tuberculosis or consumption prevails greatly among cattle; few wide-awake farmers are ignorant that it was almost a plague in a neighboring state, not long ago, and that our own state established quarantine against cattle from beyond its borders; that our cattle commissioners have taken wise and effective action, so far as possible, among the herds of the state, and that they find more or less of the disease in widely separated sections. A few extracts from the last report of the commissioners are in order here. They say (State Board of Health Report, Vol. 14, p. 140):

"The theory was long ago exploded that consumption is hereditary, and the theory has become equally well-established that the tendency to overcome or to develop the tuberculosis germ is transmitted in blood lines. This is nothing more or less than a delicate constitution in the one instance and a rugged constitution in the other, and the same principle applies both to the human and the bovine race. The one may fall an easy victim to tuberculosis, upon the most trivial exposure, while the other may feed upon tubercle bacilli and never suffer harm. . . . One of the most potent agents in the destruction of the germ is sunlight, and more of this health-giving agency should be invited into cattle stables. It costs little, and has other healthy effects in addition to its power over the tubercle bacillus. The cattle stables should be arranged on the sunny side and should be well provided with windows. We have noted on various occasions the effect of dark, damp

stables, and have almost invariably found the disease in such places. We have also noticed the absence of the disease under the opposite conditions. We have in mind an instance where a tuberculous animal quite advanced with the disease was kept in a herd with twenty-five cattle for two years after the disease was noticed, and upon applying the tuberculin test to the entire herd, this badly diseased cow was the only one that responded. The reason that none others had contracted the disease was the fact that the sanitary conditions of the stable were first class, and a spot as large as a person's hand could not be found in the entire stable where the sun's rays did not penetrate. Open up the dark, damp, dingy stables and let in heaven's pure sunlight, and there will be less tuberculosis."

If these things are so, and if there is a mitigation of the evil so easy, amounting, perhaps, to a simple remedy in many cases, may not the public protect itself? Shall consumers be indifferent when cattle are shut up in the darkest corner of a barn, where a lantern is needed at all times to see clearly, where solid and liquid manure is allowed to accumulate for weeks,—yes, during three months in a case known to the writer,—where the air is so rank with damp effluvia that the unaccustomed visitor is nearly overcome, where drainage is neglected and all the conditions are filthy?

We are told that the consumer has an infallible remedy in the sterilization of the milk, which has been widely practised now for many years. This is true; but sterilized milk causes difficulty with many, if not the majority of, users. Moreover, a great mass of consumers know little or nothing about it, and for all there are times and places in which so much painstaking is very inconvenient, if not impracticable.

There are still too many, all over the country, who are yet contented with the old ways, who do not want to know any better. With such moral suasion can do little; it costs too much to be neat and clean and nice about your premises. Public sentiment may do more, but more than all effective action is needed. There should be competent inspection by those who have full authority. What more proper authority

than the local board of health? Generally its jurisdiction is not now too extended; the public must learn to value at its true worth a good health board, and expect it to discharge its full measure of responsibility, and insist upon laws which will make it most efficient. The advocates of better sanitation must not rest until such a result is secured, nor until it is possible to have such reasonable and appropriate inspection and watchguard of our water supplies and dairy products as shall secure to all of our people, the more favored and less favored alike, a good degree of protection.

We say a "good degree," for that is all. The utmost care and most expensive measures of a purely official kind cannot secure perfect immunity. We are not extremists. We refuse to be classed with "too particular" or "over-nice" people. We are contending for common decency and everyday prudence. If these things are so, what we have proposed is simply a matter of "horse-sense," as the saying is. In spite of the most rigid inspection quantities of unclean and, at times, dangerous milk will be sold. The timid or fastidious and the sickly ones may still have good reason to sterilize. The markets will not be wholly free from tuberculous beef and trichinæ in pork, and the wise folks will continue to eat all meat "quite well done."

No thoughtful mind can fail to recognize the leading of Divine Providence in the superior knowledge vouchsafed to this generation concerning the causes of disease and the means of combating it, and in the consequent increase in the average length of human life by more than twenty per cent above that of a century or two ago. If we, in our time and place, are true to our trust, we may do something towards changing the conflict from a desperate battle to an occasional skirmish.

The question before us might be presented in some other connections and details, some of which have been alluded to, but this is not an occasion to aim at fullness on so large a subject. We have intended only to make a few suggestions and stir up an interest which shall result in effective action—let us hope.

SANITARY SCIENCE AND CIVIL ENGINEERS.

Since it is the special duty of boards of health to maintain the rights of the public in sanitary relations, it may not be out of place to make a few remarks bearing upon the personnel of such a board, and the estimation in which it should be held. In its membership physicians are necessarily considered to be indispensable and lawyers scarcely less so; usually also the importance of a representative of the engineering profession is also recognized, and the latter by the nature of his work is commonly a man of large affairs who understands business. Perhaps we are not so near the border of a neighboring state as to deter us from quoting the tribute paid to the engineer member of the Massachusetts board of health by one of his colleagues. Prof. Wm. T. Sedgwick, biologist of the board, first setting forth the end proposed, says :

"The aim of the biological work has been to discover the origin, functions, and fate of the various organisms concerned in sewage disposal, to differentiate the functions of the organisms involved, so as to learn the conditions of their usefulness, or, if necessary, of their removal; and to co-operate to the fullest possible extent with the engineers and chemists of the board, in the solution of mixed problems, for the sake of arriving at improved and safer methods of sewage disposal and water supply.

"I desire to acknowledge my sense of personal obligation to the chairman of the committee on water supply and sewerage, Mr. Hiram F. Mills, the member of the state board of health resident in Lawrence, who has not only contributed to the investigations of the board, without remuneration, his well-known engineering attainments, but has also personally devoted the greater part of his time to the co-ordination of the work of the Lawrence experiment station, so that whatever of permanent value has been achieved even in a department like this, perhaps the remotest from his own, is largely due to his suggestive guidance and criticism."

One most important result of the researches and wise oversight thus referred to is the now familiar Lawrence filter-bed,

covering two and one half acres, which has given the city the priceless blessing of a nearly pure and quite safe drinking water, even from a source so polluted as the Merrimack river.

For a most appreciative statement of the proper relation of various interests and callings in the promotion of sanitary progress we beg leave to make one more quotation. Three years ago the editor of *London Engineering*, the most widely circulated paper of its class in the world, wrote as follows :

"The preservation of public health is largely an engineering question. It is the business of the engineer to impound, filter, and distribute water supplies, to provide sewerage systems for carrying away the waste of towns, to treat sewage at outfalls so as to render it fit to be discharged into rivers, and in other less important ways to meet the ills that arise from the aggregation of large numbers of population on a limited area. But before he can do this effectually he must have the assistance of chemists, bacteriologists, and medical men; he has not the skill to analyze samples of water, or to conduct any inquiry into the number of bacteria by which they are pervaded; he cannot discriminate between pathogenic and innocuous microbes; the deadly nature of sewer gas is revealed to him only by the researches of the physician. Fortunately, he has no difficulty in procuring the requisite assistance; this country has long possessed a large number of skilled sanitarians, who devote their lives to the investigation of problems affecting health, and whose labors have put us in the forefront of the world on this question. If it were merely a question of the requisite skill and knowledge on the part of the experts, sanitary science would advance at a very rapid rate. But there is another aspect of the question, that of finance. The funds have to be found by the public, and as the general knowledge is usually very imperfect, there is a disposition to defer important works as unnecessary, and when they are commenced, to cut down the expenditures far below the proper amount. There is no organized agency for showing the public how much they have gained from sanitation, and what further safeguards could be provided for their lives

and health, if they would only find the means. Of course, it is generally known that cholera has been practically abolished in this country, and that typhoid fever has been greatly reduced by the provision of pure water and efficient sewerage. But very few people are aware how much their expectations of life have been increased and how much the community has directly gained by decrease of illness and the preservation of life. As far as we know, there is only one state in the world that takes active steps to keep its citizens well informed as to what they owe to sanitary science, and as to what they may expect to gain from it in the future, if they will only make the necessary outlay. This is the state of Massachusetts, the annual publications of the board of health of which are read not only locally, but in all English-speaking countries. It sets an example that might well be followed elsewhere, and of which it is sure to reap the benefit in the higher intelligence and the better health of the people."

We may excuse an Englishman's usual lack of knowledge of things American. He should have recognized the excellent work done by boards of health in other states of our Union. We believe that our own state board is doing equally effective work for this state, in proportion to the powers granted it, and means at its command.

There is a very important question of public right, affecting the interests not only of ourselves, but of our immediate posterity, and that is :

PUBLIC OWNERSHIP OF PUBLIC WORKS.

We are concerned now only with water-works and the sewerage works which are usually a necessary consequence. Without any aspersions upon the companies which own and satisfactorily operate many excellent systems of water-works in this state, it must be admitted that public sentiment is growing more settled in the belief that the rights of all parties are best secured by public ownership. Of 3,196 complete works in the United States, 1,690 are owned by the municipalities which they supply (Manual of American Water Works,

1897, p. 11); of the fifty largest cities in the United States, nineteen have changed from private to public ownership, and only nine are now dependent upon private companies. Altogether, about 200 cities and villages have changed from public to private. Over one half the changes from private to public ownership and only one tenth of the number from public to private. Over one half the changes from private to public ownership have been made since the close of 1890, and only one third of the reverse changes in the same time. In Massachusetts, thirty companies in twenty-seven different cities and towns have given way to public ownership since the city of Boston built the Cochituate works in 1848, and there remain thirty-eight private, against one hundred and thirteen public, works.

Public works, well built and well managed, are for the entire community, a matter of common interest and proper public pride. In the smaller cities and villages, every taxpayer may feel a sense of ownership, and take satisfaction in the thought that he has some voice in the management.

Reference has been made to the matter of cost of such works, and the reluctance of the public to provide sufficient funds. Cities and large towns, with resources proportionate in good degree to their needs, rarely fail to obtain competent advice from experienced engineers. This is only common prudence. But small communities and even large villages sometimes proceed in a short-sighted and blundering way. Having scanty resources at best, often relying upon local talent as quite sufficient to plan and construct such apparently simple works as a mere pipe line from some spring, pond, or brook, or a plain system of drainage, and acting upon the principle "If there is any profit in it, we want to make it," they use up their small capital, only to obtain at last, works which are either inadequate or defective, if not partial failures. They realize too late, that such questions as a proper source of supply, a possible gravity, as against the ever expensive pumping system, the probable future demand, storage capacity for dry seasons, various desirable uses, if the

supply can be made larger than at first thought of, size of pipe (considering possible demands of fire service and allowance for rust or other deposit), loss of pressure due to flow, friction loss, blow-offs, grades, gates for controlling the line in emergencies, that these and not a few other questions call for special knowledge and experience. A few hundreds of dollars spent for surveys and expert opinion may save many times the expense, either in mistakes avoided, or larger results obtained. In these days, when competent advice is so available, there is no excuse for neglecting it. Communities in New Hampshire would be fortunate if they were compelled by law, as in Massachusetts, to consult the state board of health, and have the merits of all plans passed upon, after full examination of quality and sufficiency of water supply, etc., and surveys made, by biologists and engineers acting for the board. But the lack of public appreciation of the public benefit of such a policy, and the fact that it would call for some increase of the appropriations, render it unlikely that our state board will be able to render such service, to its proper extent, for some time to come.

SUMMING UP CONCLUSIONS.

Summing up, we find that the public rights as to sanitation in this state are already well secured by adequate laws relating to abatement of neighborhood nuisances, infectious diseases, direct pollution of water supply, special examination of suspected water in certain cases (but such examinations in the past have been chiefly chemical only), improvement of swamp lands for the public benefit, quarantine on our borders, and in relation to railroad transportation, and cattle inspection, so far as the means granted will allow.

We have seen that the purity of water supplies, as to danger of infection from beyond the immediate surroundings, and the purity of dairy products, are not yet sufficiently guarded.

We can take satisfaction in the assurance, that the new law for constituting local boards of health, which secures uniformity of appointment, and a three years' tenure of office for each member, is a great gain to the state.

We have proposed that such local boards of health shall have jurisdiction as inspectors, with power of reasonable action in emergencies, in all cases where there is manifest danger to the public from conditions which threaten the purity of any source of water supply or which are liable to infect dairy products. We propose that the law shall prescribe such co-operation between local boards of health and the cattle commission, that the latter may be promptly notified of any dairy premises where cattle disease is known to exist, or kept in such condition that the existence of disease may be fairly presumed, and that action in any case shall not be delayed.

We propose that the state shall take proper action to prevent the systematic discharge of the wastes from mills, factories, and villages into waters which ultimately become sources of supply, even though it be at some more remote point. This, of course, excludes the Connecticut river, which already has been abandoned to serve as a receptacle for sewage and other wastes from the states along its banks. It may not be too late, however, to rescue the Merrimack from sewage pollution by its bordering towns, if any consideration is demanded for the cities of Lowell, Lawrence, and Haverhill, which are now forced to drink its waters.

We also urge the need of better appreciation of the value of bacterial analysis of water or milk against which there is a fair presumption of infection, and that the state board of health have authority and means to employ a skilled bacteriologist to make all necessary examinations in such cases.

We urge that local boards of health be prompt to take such wise action, according to various circumstances, as shall rescue from the thoughtless and careless expectorator the public right to neat sidewalks on our streets and clean floors in our railway cars.

Finally, we urge that local boards of health be allowed such amount of discretion and compensation, without unreasonable restriction, as shall make it possible for them to devote to their duties, time and attention in proportion to their responsibility, and which shall secure to their respective towns, the full measure of service which the public ought to have.

THE SANITATION OF OUR SUMMER RESORTS.*

By G. H. SHEDD, M. D., NORTH CONWAY, N. H.

During a portion of each year, the rural population of this state is largely increased by the dwellers of cities and towns of other states, seeking health, comfort, and happiness. They may be found by the sea, on the borders of our beautiful lakes, in the valleys and among the grand old mountains, the charm of whose beauties is not excelled by any in the world.

To supply the needs of this summer population, beautiful cottages and elegant hotels have grown up throughout the state, representing millions of dollars of capital, giving employment to an army of students and young people, and furnishing a home market to isolated farming communities that can never be fully appreciated until lost.

To these must be added the hundreds of private cottages, many of which are models of architectural beauty and rich in all that wealth can give, furnishing permanent summer homes for those who have found, with us, that which satisfies mind and body, and the numberless farmhouses, everywhere, whose open doors are eagerly sought by those who desire quiet and seclusion or have not the means to summer at a fashionable resort.

Thus the "summer boarder" has become a large and increasing factor in the growth and prosperity of our commonwealth; second, as I believe, to no other industry within its borders. For, not alone is his value to the community in which he resides to be measured by the dollars he leaves with it, but note must also be made of the value of the character and ability of the individual himself; who, not infrequently, makes our interests his own, and by his wise counsel and broader culture stimulates moral and intellectual growth among the people with whom he sojourns. These are the friends whose coming is eagerly looked for, and whose going casts a shadow brightened only by the thought of their return.

* Read before the N. H. Association of Boards of Health.

If it is true, as I believe it is, that the summer tourist in so large a degree adds to the wealth and prosperity of the state, then it is wise that we see to it that his environment is such as to invite rather than to compel him to seek his health and happiness elsewhere. So, by a somewhat circuitous route, I come to the subject of this paper, "The Sanitation of Our Mountain Resorts." It is not expected that a physician, necessarily, is a sanitary expert, and I shall attempt to treat this subject from a physician's point of view, only. I therefore ask your indulgence if I but rethrash old husks, and leave the kernel uncovered. Pure water and pure air are the two first and most important considerations in the sanitation of summer resorts; and, with pure soil, form a complete formula for good sanitation. As the time at my disposal does not allow a consideration of the subject as applied to resorts in all parts of the state, I have confined myself to mountain resorts, and practically to the east side, comprising the towns of Conway, Jackson, and Bartlett. This circuit includes forty-five hotels and boarding-houses, receiving water supply as follows: Twenty-two are supplied by the North Conway Water & Improvement Company, which takes its water from Artists Falls brook east of the village of North Conway, and Mountain brook in Upper Kearsarge. Both these brooks are mountain streams, fed by springs, and the reservoirs are situated high above all possible sources of contamination.

This system furnishes North Conway, Intervale, and Kearsarge abundantly for all purposes except in very dry seasons, when, for a few days, it is not fully equal to the great demands for irrigation. This water has never to my knowledge been analyzed; but I have found it remarkably pure and free from organic matter, excepting after heavy rains, then for a day or two it is slightly discolored and there is a little deposit of vegetable matter.

Conway Village is supplied by the Conway Aqueduct Company, which takes its water from brooks in the hills west of the village. These are fed by springs, and the conditions are much the same as in North Conway. Some years ago, this

water was analyzed by Professor Angell and pronounced by him the purest public water he had ever examined. The supply is sufficient for all purposes.

The only other public system is in the village of Bartlett, where the water is brought from a brook west of the village about two miles. This furnishes good water in sufficient quantity for all purposes. Of the remaining houses, all but four are supplied by private systems, which bring water from springs and small streams situated in neighboring hills, and above sources of pollution from surface and subterranean drainage. In nearly all cases, these are sufficient for irrigation and ample protection in case of fire. The remaining four are dependent upon wells, some of which are not above suspicion, though I have never known sickness directly traceable to any one of them. I think I can safely claim that the first requirement of good sanitation is fulfilled. Certainly, if there is a section of country outside the mountains of northern New Hampshire that furnishes purer water to so large a percentage of its people, I do not know where it is to be found.

Pure air is one of nature's free gifts; and perhaps her generosity is nowhere better appreciated than among the hills of this state. But the abundance of this gift should not cause us to forget that there are dangers in possible sources of pollution, which increasing numbers make more potent.

First of these is drainage. This is a knotty problem to many of the large hotels, but I think in most instances it has been solved very satisfactorily. Out of the forty-five houses, mentioned under the head of water supply, twenty-five have systems of sewerage with closets and baths. These discharge either into cesspools or into some convenient water-course. While the discharge of sewage into underground receptacles is not an ideal method of its disposal, in many instances it is the only method available, and it has thus far been followed by no serious consequences. Some of the wells are ventilated and some are not. A few are constructed in pairs—one for the kitchen wastes and the other for the closets. This is the better plan, as the grease and other materials from the

sink form a coating upon the sides and bottom, which prevents free absorption of the fluids. The extremely porous character of our soil renders this method of disposing of sewage less objectionable than it would otherwise be. The sewers are well trapped in the main, also at sinks, tubs, and closets; and, in the latter, good ventilation is secured by extending the soil pipe through the roof. The earth closets are confined to small houses, and, where used, great care is taken to keep them cleaned. Fresh earth is freely supplied, and a free circulation of air is secured. Sinks, in most instances, are drained under ground, and either trapped or ventilation is had outside the building.

Much has been said against the use of waterways for the disposal of sewage, but this method of drainage for our large hotels has appeared to me the least objectionable of any. Each spring these streams are mountain torrents and their entire bed is changed by the force of ice and water, while during the summer months they are flushed by every heavy shower, and their rapid fall allows the free oxygenation of organic matter in short distances. I have yet to see any ill results from their use for the disposal of sewage, and unless furnishing water supply below the entrance of sewers, I would consider this means of drainage the safest and best at our disposal. The earth closet is safe if properly managed, but it requires a good deal of care and is inconvenient and unsightly; so much so that it has been abandoned wherever possible to introduce the water-closet system.

In all instances in which cesspools are made the receptacles for sewage, it is imperative that they be sufficiently large to insure against overflow. They should be thoroughly cleansed at least once a year, and ventilated by a pipe of sufficient height and size to prevent any odors of sewer gas about grounds and buildings.

The ventilation of summer hotels is not a matter of much concern. People do not go into the country to stay indoors, consequently everything is wide open and air has free circulation through open doors and windows from ground floor to

attic. Large open fireplaces in offices, parlors, and reception rooms furnish a ready means for the escape of vitiated air when, on account of inclement weather, doors and windows are closed, while at night, wide corridors conduct streams of fresh air through all parts of the house.

In the help's quarters the conditions are changed; as the season advances the volume of travel increases, reaching its height during the heat of August and September. Then everything is taxed to the utmost and the whole machinery is run under high pressure. Help is crowded into attics, over kitchens, wash-houses, carriage houses,—anywhere. In some instances the rooms are small, the passageways narrow, and the ventilation poor. In addition to this, the rooms are, in some cases, untidy and I have found a few almost filthy. What wonder then, where these conditions prevail, that under their depressing influences, associated with extreme heat and scant sleep, bowel troubles are sometimes epidemic among the help while the front of the house experiences no trouble whatever? I do not wish to be understood that the employees at summer hotels are overworked or not allowed sufficient time for sleep. On the contrary I believe their work is *not* extremely hard, and in some instances very light. But the conditions of hotel life, for them, are such that many do not take the time for rest and sleep they might, and those who would rest cannot, because others will not. It has appeared to me that too little attention has been paid to this matter, even by those who are particular that all other parts of the house are in first-class condition.

As far as my observation extends, the waste from the kitchen is carefully attended to daily or oftener, and store-rooms, refrigerators, cellars, and pantries are kept scrupulously clean. The final disposition of this kitchen garbage can in some instances be questioned. When swine are kept for its consumption, unless at considerable distance from the house, the condition during the hottest weather does not fall far short of being a public nuisance; and I have known of some such places that were dangerous to public health. This

matter has received the attention of the health board in times past, which has resulted in much improvement. In my opinion there is opportunity for further improvement in this line; but changes which involve expense are sure to meet with strong opposition even when, in the end, the individual as well as the public is to be benefited thereby. A bad smell is not always a menace to good health, and the question frequently arises whether a bad odor from a certain locality is of sufficient importance to require action for its suppression. One occasionally finds a person whose olfactories are so acute that they appreciate the suspicion of a disagreeable odor, and whose imagination is as active in picturing resulting evils as his nose is keen in detecting a smell. Disagreeable odors from any source when so marked as to be a cause of discomfort to the public, become a nuisance and should be treated as such, even if not positively injurious to health; but if the extravagant demands of hypersensitive persons are heeded, the community is kept in constant turmoil, and soon loses faith in the whole scheme of sanitation.

I think a word may properly be said relative to the care and preservation of the natural scenery of this part of the state. The pine forests have *always* had great attraction for the summer tourists, and there are not many pleasant days that one cannot find many more enjoying their cool shadows and breathing deeply of their balsam-laden breath, than can be seen in the corridors and on the verandas of the hotels. To many, these groves are the chief attraction that brings them to the mountains, and they spend nearly all of their waking hours lounging on the carpets of pine needles, reading, or dreamily watching animal life and forgetful of the world outside. In too many instances these noble trees have been sacrificed in the interest of a few lumber dealers and at such a loss to the boarding interests that it has frequently occurred to me that the town or state had better have purchased these tracts of magnificent pines, now destroyed, which for years were the delight of *all* who came to the east side, and held them as public parks. Some hotel men, recognizing the value to

the boarding interests of this heavy growth, have bought and preserved large groves near their houses and keep them tidy for the comfort of their patrons.

But too frequently, where but a year or two ago were shade and beauty, are now only the old dry mantles of the noble trees that were victims of the ax in previous winters—a melancholy spectacle, unsightly, inviting the deposit of rubbish of all sorts and needing but a spark to become dangerous to surrounding property. This is not an ideal picture, it is a reality; and it is with increasing fear that I mark the gradual but sure destruction of these and other natural objects, which long have been a part of the beauties of this region. Hills once clothed are now naked; ledges and grottoes that have long been a delight to thousands of visitors, fade under the quarryman's hammer, and giant boulders are sacrificed for a few building stones.

These objects may not have been necessary to health, but they have gone far toward rounding out the comfort and happiness of the people who visit us. They have long been summer idols, loved and adored, and as they crumble, one by one, the appreciative turn sorrowfully away, never to return.

Perhaps I have strayed from my subject, and, to bring me back, some one may ask, What are the prevailing diseases in mountain resorts? My answer is, digestive disorders, principally. These are mostly caused by long journeys to the mountains in the heat of summer, and the accompanying irregular and often improper diet; by too free indulgence at the table and lack of sufficient exercise; and the pernicious habit of sitting upon hotel piazzas in the chilly evening air, as lightly covered as during the heat of the day.

Contagious diseases are not common. In five years' practice among the hotels of the east side, I have seen but one case of scarlet fever; and in that the rash was apparent the morning after the child arrived.

There have been but two houses infected by diphtheria. In the first, there were five cases with but one death. The source was unquestionably traced to the family dressmaker, who, just

before the family started for the mountains, went to visit a sick niece. It was afterwards ascertained she had diphtheria. The little girl of the family, whose dress she was making at the time, came down with a sore throat a day or two after her arrival in Conway. The case was treated as follicular tonsillitis until the day before her death, when the health board was notified that it might be diphtheria. There had been no isolation, and the mother, aunt, chore boy at the house, and one of the nurses contracted the disease. These recovered, The house was cleansed and closed for the season. That was five years ago, and the house has been filled every season since with no further outbreak. There were no other cases in town that year.

The other case occurred in a boarding-house containing several families of small children—twelve in all. This case was traced to a package of clothing which an aunt had sent as "Just the things to be switched out in the country." They had belonged to her little girl who died of diphtheria. A few days after the clothing was unpacked and put on, the recipient came down with diphtheria and died. In this instance careful isolation prevented the spread of the disease, and the other inmates of the house, after a sufficient quarantine, were scrubbed and sent home. Their clothing followed after fumigation, and none of them contracted the disease. The house was cleansed and closed for the rest of the season. There has been no further trouble there. There were no other cases in town.

Typhoid fever is not so common in our summer resorts as is popularly supposed. I can recall but twelve cases in an observation of five years covering nearly every hotel and boarding house on this side. When one considers the large number of people that annually register at the different hotels (about 25,000 according to a careful estimate made by the board of trade of North Conway for the year 1891) this is not a bad showing. Eight of these were among the attendants. Of the other four, one was a young lady who came up from one of the islands in Casco Bay to a point above the mountains. She

arrived ill and finding trouble in getting a room at any of the houses she came to Lower Bartlett in a semi-conscious condition, and died in forty-eight hours. A pretty strong object-lesson for those who send typhoid patients long journeys home as soon as the disease is recognized.

As a conclusion to an imperfect treatment of this subject, I would like to offer the following suggestions: That the state board of health make a careful inspection of the principal resorts in the state, at such intervals as will best serve the boarding public; that all doubtful water supplies to health resorts be analyzed by the state chemist; that the local boards make an inspection of every hotel and boarding-house at the beginning of each season, and if found in good sanitary condition, a certificate be given to that effect, signed by the board; that we use our influence as physicians and sanitarians for a system of sewerage in every town where there is a public water supply; that we insist that the preservation of our forests and other objects of public interest is imperative, if we foster the principal industry of the state, and that we never send a case of probable typhoid fever a long journey where it is impossible to avoid it.

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SUGGESTIONS FOR LAYMEN HEALTH OFFICIALS.*

BY WILLIAM K. ROBBINS, CHEMIST OF AMOSKEAG MANUFACTURING COMPANY, SECRETARY BOARD OF HEALTH, MANCHESTER, N. H.

Once the human race divided itself into two grand divisions: the three learned professions and the ignorant masses. Owing to the meager facilities for education, only a favored few could receive the advantages for intellectual advancement, and there was a proper basis for the general sentiment that the wisdom and judgment of the world resided with them only and that the common people, the laity, might not enter their charmed circle to question the accuracy of their wisdom or the consistency of their actions.

Custom and tradition have brought this feeling all along down the pathway of civilization, and even now it sways public sentiment to an unwarranted degree.

But free schools, free libraries, free speech, and free press have obliterated the sacred circle and removed the mystic veil.

The laity have made progress far out of proportion to that of their professional brethren, and today any American citizen may easily have information, discretion, and judgment that the doctors of divinity, of law, and even of medicine are bound to respect.

It is not only the privilege but the duty of every one to be informed in regard to the fundamental principles of the various professions—now many times the original three—to the end that he may do his share in promoting the religious, moral, and physical health of mankind.

* Read before the New Hampshire Association of Boards of Health.

Disease and death no longer fall from midnight damps and angry gods. Incantations, conjurations, supplications, charms, and the miraculous powers of physicians have had their day. Rationalism has replaced superstition and empirical guessing has given way to scientific investigation. The recent advances in the comparatively new science of bacteriology bid fair to revolutionize the practice of medicine. They have already established a new departure in sanitation; have virtually made it a practical science and a useful art. It is now thoroughly demonstrated that a real, actual thing, a concrete substance, a microscopic living organism is the etiological factor in all decay as well as in all infectious and contagious diseases. In scarlet fever, yellow fever, and smallpox the specific microbes have not been differentiated, but doubtless will be as soon as some bacteriologist shall find a medium outside the body in which they will grow.

Where these are not, the diseases cannot be; with them the diseases may be produced at will. To battle with them is, therefore, the perfectly definite aim and business of sanitation.

The enemy has already been deprived of cover and brought into the open field for the fray. They know nothing of our charms and supplications. They cannot smell our assafœtida bags and they have neither fear nor respect for the pocket-worn horse chestnut.

Our starting point to their destruction is, therefore, to learn their life history, the conditions and products of their growth. We may not all become adepts in bacteriology, but any layman may acquire a fair understanding of its fundamental principles. Physicians do little more; very few attempt to do actual work, since the necessary time, facilities, and technical manipulation are incompatible with an ordinary practice. They, like health boards, must depend upon the results and verdicts of scientists or specialists in this line, many of whom know medicine only as they know law or astronomy. Hence every health official should read some of the many good books on the principles of bacteriology.

The scientific terms are not so many nor so formidable as

one might expect. The chapters on the mechanical technique may be a little tiresome, but the bulk of the work will be an entertaining and interesting revelation. Some reliable medical journal should also be read, and a close watch kept upon the reports of other boards of health, especially those of large cities, which often contain much valuable and original information wrought out in their bacteriological departments; and finally, for specific guidance, the laws, ordinances, rules, and regulations of the state and local board will be ever at hand.

In all we have exactly the same sources of information that physicians have, and if we digest the whole with a liberal allowance of that old fashioned common sense that would find a haystack before looking for the needle within it, we will have a basis of judgment that will command respect among both lay and professional critics.

Although sanitation is a comparatively new element in municipal affairs, many of its minor activities are already commonplace; but among the important subjects that call for better general knowledge on the part of the health commission are antiseptics which retard the growth of germs and disinfectants which destroy them.

The general conditions of life are moisture, warmth, and organic matter for food. The conditions of death—heat and poisonous substances.

Taking advantage of these facts and conditions then all unknown, the ancient Egyptians preserved their mummies, and our grandmothers saved many fruits and vegetables by drying. The present tremendous system of cold storage is successful in keeping perishable materials for long periods of time by reducing the temperature below the point where bacteria will grow.

Almost every soluble chemical substance will prevent growth at some given point of strength or dilution, as vinegar keeps pickles, sugar and fruit juices keep jams and jellies, boric acid keeps milk, alum makes a poor flour work more like a good one, and even the soda present makes fairly safe the piece of soap you use in common with everybody at the hotel. In

these cases the germs are not killed, growth is simply prevented, since if the moisture is restored, the temperature raised or the chemical substance diluted, growth will at once proceed. The treatment, therefore, is only antiseptic. This should not be confounded with sterilization or disinfection, which aims to destroy all germs so that no further growth from them is possible.

The cheapest destroyer of these organisms, and the natural one, is the direct light of the sun. Where this is not available we must depend upon artificial means such as heat, dry or moist, and chemical substances either as solids, liquids, or gases. Dry heat, being effective only when far above the boiling point of water, is little used except where actual combustion is available.

Moist heat is effective at boiling and if employed below that, say 160° , it must be repeated several times. In the form of steam, where it may be confined, the effectiveness is very satisfactory.

When chemical substances are used it is absolutely necessary that they be brought into actual contact with the germs to be destroyed.

Dry substances or powders of any kind may be promptly rejected at all times, because the necessary contact cannot be relied upon. They may act as temporary deodorizers by absorbing foul gases or covering up the odor by one more noticeable. If used at all, dry road dust is as good as anything.

With liquids or chemicals in solution, articles or places to be disinfected must be thoroughly saturated lest some germs escape uninjured.

With gaseous substances the ever necessary contact is still more difficult, since the air surrounding the germs is not replaced by a gas as by a liquid. Where the air can be removed, as in a vacuum, the action is prompt and effective and the penetration excellent.

Such application has been tried at the port of New York with most satisfactory results.

In normal atmosphere larger quantities of a gas are necessary, and with the best confinement attainable the exposure must be long to permit natural diffusion to replace the air with enough of the poison to produce a fatal result.

As this is extremely slow in small spaces such as pockets, folds of cloth or paper, etc., no deep penetration should be expected.

In the light of these facts, how utterly unreasonable and useless it is to send a person clad in all the wraps suitable for severe winter weather into a room where sulphur fumes are being generated to remain only as long as one can hold the breath, and yet within the past decade this farcical performance was enacted at every important railroad station between Boston and Montreal and all classes went about with comfortable assurance that they were being thus protected against smallpox.

Probably the most serious difficulty confronting health officers in their efforts to protect the public health is the non-co-operation of their fellow men. Of these many varieties have received attention at one time and another but there remains a most important class : the practising physician, whose sins of omission and commission professional etiquette decrees may be reviewed publicly only by laymen.

Being directly concerned with the treatment of diseases, they have a realizing sense of the wisdom of sanitary measures and precautions, and the great majority of them do live up to the ideals of an occupation devoted to the saving and prolonging of human life. But then there is a considerable minority, many of whose sentiments and professional acts provoke the protest of meek and modest laymen. Theoretical sanitarians they must of necessity be, but whether practical or not, may be judged by a few instances which have fallen under the notice of the Manchester board of health.

About two years ago a letter was mailed to each physician practising in the city requesting that all cases of consumption be reported to the board of health, the same as other contagious diseases.

Up to the present time no cases have been reported although the deaths from that disease number 84 for 1897. The proportion of doctors who enrobe while attending patients sick of a contagious disease is as yet extremely small.

A considerable number of cases of infectious and contagious diseases have been found that were not reported according to law.

To such a case the board of health sent the city physician, who reported a bad case of diphtheria. The house was placarded and declared in quarantine. The attending physician advised the people to pay no attention to either. Within three days the child died, and the certificate giving diphtheria as the cause of death was signed by that same attending physician.

Many of our cases of scarlet fever are certified as recovered and free from contagion in less than four weeks and several cases in one week from the beginning of sickness. Repeatedly have our inspectors gone to fumigate and remove placard on a certificate of recovery and found the patient in the midst of desquamation. In a recent instance it was found that the doctor had not seen the patient for two weeks, but signed the certificate of recovery at his office. People often complain to the inspectors against being quarantined. They say, "The doctor comes here, handles the patient, and goes directly to the house of a neighbor to visit a patient sick of a non-contagious disease, without changing clothes or washing his hands." A case of diphtheria is reported. We placard the house. The patient dies after a few days, and the people want a public funeral. Then we get a letter from the physician saying the disease was not diphtheria but bronchitis.

A physician uses a spoon in examining a case which he pronounces true diphtheria, takes the spoon from the patient's mouth and tosses it upon a table among others, and without washing of hands or changing of clothes leaves the house.

A doctor goes uncalled into a house placarded for diphtheria, being acquainted with the people. Examines the child, says it is not diphtheria, and without washing the hands proceeds

with his calls upon patients. The child dies of diphtheria within twenty-four hours.

The board of health issues a permit to work to a person in a house where a case of contagious disease is safely isolated, with the distinct promise that there will be no communication with the sick room. When the inspectors discover the violation of the pledge it is excused by saying the doctor said it was all right.

A doctor desires to use antitoxin but does not, because no one will pay him back the \$3 that a syringe would cost. Another seriously suggests that the board of health buy a syringe for the administering of antitoxin and keep it to lend to the physicians !

Only this winter the inspectors were informed that their fumigation was quite unnecessary, as the doctor had burned a small candle in the house, and told them all was safe.

No; we cannot prove to the satisfaction of the court that contagion has been spread by this disregard of sanitary precaution on the part of some physicians. Neither do we need the whip of legal penalties to induce them to make their practice conform to their own better judgment.

The spread of general information will soon enable the masses to bestow upon each practitioner a reward of patronage according as he has been faithful to his noble calling.

Not since the days of ancient Greece have natural growth, physical development, health of mind and body been so eagerly sought by each and all. Health dress, health food, gymnasiums, athletic games and all that conduces to physical comfort and strength are intelligently and generously patronized; while all the evils and baneful environments are just as earnestly considered, to the end that they may be avoided.

Notwithstanding this phase of sanitation, which is something in the nature of a fad, it has also a strictly business aspect. Business has been defined to be "man wooing man." For this purpose more depends upon the individual than the occupation he follows. There is scarcely ever a difficulty in deciding what ought to be done.

The great questions are, How much, when, where, and under what conditions? The money value to the individual and the community of clean streets, pure air, food, and water, sanitary schools and dwellings and a low death rate, it is the business of the successful health officer to demonstrate.

While, therefore, we may not hope to approach the physician's judgment in advanced sanitary matters, here we may emulate him in the exercise of that courage, consistency, forbearance, and patience necessary to gain such respect and confidence of the community for health boards as will enable them to battle successfully with disease and death.

ABATEMENT OF NUISANCES BY LEGAL PROCESS.*

BY DON H. WOODWARD, ATTORNEY AT LAW AND MEMBER
BOARD OF HEALTH, KEENE, N. H.

The experience which the board of health has had in Keene during the past few years may be briefly stated in illustration of my subject. In the years 1882 and 1883 the Waring system of sewerage was put in, covering the principal streets of the city. It has been greatly extended since that time, so that now about seventeen miles of sewer pipe have been laid at a cost of about \$86,000. In 1883 the contract for putting in the sewer was completed, and in August the city took possession of it from the contractors. No connections were made with it in 1883. In 1884, and for years prior thereto, there had been old drains, made some of stone and some of wood, running through various streets. These drains had taken the surface water and sink water, and often were in a filthy condition,—especially in dry seasons, when there was no surface water to pass through them.

The first thing to confront the board of health was, that some of our people claimed (and I think rightly) that as they were connected with these old drains, which had been in use as public sewers for more than twenty years, the board of health could not force them out of one public sewer into another public sewer. Thereupon, on the recommendation of the board of health, the city councils discontinued the old drains as public sewers, and this left the new system as the only public sewers in the city. In July of that year the board sent out notices of the action taken by the city councils to

* Read before the New Hampshire Association of Boards of Health.

the owners of property by the side of the old drains, and eighty-three houses were connected with the new sewer that year, and this was about all the plumbers could accomplish.

In years following it became apparent that there were many property owners on streets where the public sewer was laid that would not connect their premises therewith. It therefore became necessary that the board of health should invoke the law. There was no other alternative. The policy adopted was the use of the criminal process.

Now by Sect. 8 of Chap. 108 of the Public Statutes, when the public sewer comes within 100 feet of a man's premises (not 100 feet of his privy or sink) and his premises are not provided with suitable drains for conveying the sink water away, he may be prosecuted; and under the same section, if his buildings are not provided with suitable privies and vaults, properly ventilated and constructed and kept in a sanitary condition, he may also be prosecuted, if he does not connect his premises or buildings with the public sewer; under the same section of the law, again, if there is no public sewer, he may be prosecuted for not properly conveying away the sink water or for not having privies properly constructed. So there are at least four different kinds of criminal complaints that may be made under that section of the statutes.

But, however, before proceeding with any complaint in this way, a written notice is to be made and given to the owner or occupant of the premises, briefly stating the cause of the complaint, that the same is a nuisance or that it is dangerous to health, and requesting the owner or occupant of the premises to connect his sink or his privy with the public sewer, if there is one within 100 feet, or if not, requesting him to abate the nuisance in some form agreeably to the language of the statute. The notice should prescribe a limited time in which it is to be done. The time so limited in the notice is not fixed by law, except it must be a *reasonable* time. The notice itself is important, because it is the foundation of criminal proceedings,—proceedings which cannot be begun without it,—and therefore it should be accurate. Remember, too, if there is to

be a trial the notice must be proved, and therefore a copy should be kept for that purpose.

If there is no public sewer, and it is to abate a privy as a nuisance, or a sty for swine, Sect. 10 of the same chapter is the better one, yet the notice is to be given in the same way as in Sect. 8. The fine in these cases is \$10, or less if the court thinks proper, for each day's neglect.

Do not allow yourselves to think that in our section of the state there is any amount of litigation in this line, for there is not. There have been only three or four cases in my experience of about a dozen years; and only *one* that was actually tried, and that was settled by the defendant before it reached a further hearing. It will not answer to allow the people to think that the orders of the board of health can be disregarded. If any person feels aggrieved by any order of the board, he should generally, if not always, be allowed a hearing, if he wants it. In this way orders may be modified, time extended for something to be done, and a fair and intelligent result obtained.

The other sections of chapter 108 apply in other contingencies, but sections 8 and 10 cover a large proportion of cases.

There is one section, however,—Sect. 4 of the same chapter,—wherein it is provided that the board of health may notify the owner of any building or inclosure to remove or destroy any nuisance or other thing therein deemed by them, on examination, to be injurious to the public health, within a time limited; and in case the owner or occupant, after such notice in writing, shall neglect to comply therewith, the health officers may forcibly enter such building or inclosure and cause the nuisance to be abated. The expense of this procedure is to be, or can be, collected of the owner or occupant by an action in the name of the town or city. There is no impracticability in using and applying this law in proper cases, but my opinion is, to avoid its use in all cases where there may be another course of procedure. Not simply because a person having made a nuisance ought to abate it, but because the rights of property are so clear to man, that when his property

is invaded by the health officers, even though for the lawful purpose of abating a nuisance, the owner will get in as high dudgeon as he ought to be, and afterwards, when sued for the expense, he generally contests the action, and entails an expense upon the town whether the town recovers or not. This has been my observation, but not experience, for we have never used that law for such a purpose. It is, however, a useful statute, and sometimes needed; as, for instance, the cleaning out of a ditch upon land over which the owner has full control. There would seem to be no reason why the statute should not have been made to have the owner of a filthy ditch prosecuted in the same way as the owner of a filthy sink drain; but it seems that the law is not so written.

The legislature has wisely given great powers to the health officers for the protection of the people, and nowhere has it ever been said that these powers have ever been abused; unless it may be so said by reason of their non-enforcement. There is no difficulty in having a sanitary condition in any town in New Hampshire. If any such supposed difficulty exists, the trouble is with the officers and not with the law.

Thus far these remarks have been confined to the statute law of the state, which law applies to almost all matters of complaint, respecting unsanitary conditions. There is a class of cases where the statute does not furnish the best course of procedure, or, if used, it will not always produce the desired result. In this class are such institutions as slaughter-houses, soap factories, tanneries, and the like, which are not nuisances, *per se*, but oftentimes are, depending much upon their location. In this connection comes the question, What is a nuisance? It has been defined to be "anything wrongfully done or permitted which injures or annoys another in the enjoyment of his legal rights."* In law there are two kinds, private and public nuisances. In the one, an individual is harmed in the enjoyment of his lands, and in the other, many persons are harmed or annoyed by noisome odors or in some other way. In the case of a private nuisance the remedy is usually by bill in equity praying for an injunction or some

* Wood's Law of Nuisances, 2d Ed., p. 1.

other right the complainant may be entitled to, and in the other case of a public nuisance the remedy is by indictment by the grand jury or by information filed in court by the attorney-general or county solicitor, which has the same effect as an indictment. In these remarks let it be understood that we are considering cases now under the common law, and not under the statutes. There is such coincidence of law and fact in many things between what is a public and what is a private nuisance, so far as this paper may extend, the distinctions will not be discussed. We come back again to the question, What is a nuisance? The definition does not materially help us. "The question of nuisance or no nuisance is always a question of fact."* There may be many facts that enter the question. For instance, suppose that it is a slaughter-house under consideration. Its location, its proximity to dwellings and public ways, the number of animals slaughtered, the care taken of the place, may all be ascertained with reasonable certainty, and yet there may be a doubt what ought to be done. It would seem, therefore, that the *degree* in which it is a nuisance ought to determine. A slaughter-house, a soap factory, a tannery, are useful institutions, and when located in uninhabited places they never are nuisances when properly managed, but when located upon thickly settled streets, they are. And here it might be suggested that in former times the courts held that these establishments located in sparsely settled places, where they had a right to establish them, and nobody complained, and afterwards owners of land adjacent or near thereto placed dwellings in which to live, that these persons *came* to the nuisance and they must endure it. This is an old doctrine, and it is wonderful how many people seem to understand it to be so now. But in more recent years, when our cities and villages are spreading out and reaching far from their former occupancy, the courts have reversed the old doctrine found in the books, either from necessity or from the fact that an owner may erect such buildings as he needs upon his own land, if he

* Hunt v. Mayor of Albany, 3 Paige N. Y. 218.

does no harm to his neighbor. An instance to illustrate is found in a case in New Jersey,* where a person erected his dwelling house within six inches of his neighbor's privy, and the filtrations from the privy ran and leaked through into his cellar, and the court ordered, upon a bill of equity, that the owner of the privy must cause it to be stopped.

In a case for slaughtering cattle in the city of New York,† the defendant claimed that as the plaintiff did not come into the neighborhood until after the slaughter-house was established, they were estopped to complain of its effects. The court said that when the slaughter-house was erected it was remote from the thickly settled part of the city, but the city had grown up to it, and the necessities of the population required the occupation of the lots in its vicinity for dwellings. When it was erected it incommoded no one, but now it interfered with the enjoyment of life and property; and that as the city extends, such nuisances must be removed to the vacant ground beyond; and that there was no necessity for slaughtering cattle in that part of the city which was occupied by valuable and costly dwellings. In an indictment for a common nuisance it is no defense that the business constituting it was established remote from habitations and public ways, and that the persons suffering from it afterwards built their dwellings within range of its stench and noisome effects.

And in a case in Massachusetts,‡ the court held that it made no difference even if it was established more than twenty years before dwellings came to it. In other words, no length of time legalizes a nuisance.

The reason of proceeding by indictment or information in this class of cases, is, that the court can impose a large fine, conditioned that if the defendant abates the nuisance in a time limited by the court, all the fine, except a nominal sum and costs, shall be remitted, and such an order seldom fails to have the nuisance abated.

* *Perrins v. Taylor*, 43 N. J. Eq. 128.

† *Brady v. Weeks*, 3 Barb. 156.

‡ *Com. v. Upton*, 6 Gray 473.

In addition to the statute and the common law of the state, health officers of towns may make regulations for the prevention and removal of nuisances, and such other regulations relating to the public health as in their judgment the health and safety of the people may require; and when approved by the selectmen, recorded and published, the same shall become operative. So if the people of any town or city are discontented under the law as enacted, they can make further law to meet the exigencies of their case, and if such law or regulations are not obeyed, there is a fine of \$10 that may be imposed upon complaint in a justice or police court. And again, in addition to all this, the state board of health, looking over the whole field, as it does, from its weekly reports received from all parts of the state, can make any further regulation for the health and safety of the people, or amend any existing rules or regulations as in their judgment the public good requires. These regulations are to be enforced by health officers agreeably to the language in which they are written. The legislature did as much as to say that the health and safety of the people of the state is of so much consequence that if the statutes are insufficient, you may make the rules and regulations you want in this direction, and the courts of the state shall be open to enforce them.

The system of the law has been so perfected through these years that there is not, generally, any want of rules or regulations beyond what the state board of health have promulgated. This is the experience with us. Other places, however, may find it different.

The board of health of a town or city has no powers as such, of course, outside of its own town or city limits. In cases where water is taken for a city from another town, as it is with us, and decaying animal substances, or other poisonous matter, are left by some one so near such water in another town as to be likely to contaminate it and render it unfit for domestic use, although the board of health of the city, as such, may not have the power under the statute to enter and abate the nuisance, yet as citizens under the statute they can make a

complaint and cause such person to be arrested and fined or imprisoned, and as citizens, if seriously affected by such a nuisance, they may enter and abate it. In so doing, it is the exercise of the rights of necessity, and is sustained by the common law.* No one so affected by a substantial nuisance is obliged to wait for the slow process of the court, but in a reasonable manner may enter and abate it. It is similar to the law of self-defense. It requires no statute to give this right effect, for it has existed in all ages, and it is very doubtful if any statute can take this right away.

In this bird's-eye view, as it were, of the powers vested in our boards of health to gain and keep a sanitary condition, it is plain that the way is clear and easy to accomplish the results for which the health officers are appointed. And if without malice the work is done, the people will appreciate it.

**Haley v. Colcord*, 59 N. H. 89, 3 Blackstone.

SEWERAGE IN VILLAGES.*

BY PROF. WILLIAM T. SMITH, M. D., DARTMOUTH MEDICAL
COLLEGE, HANOVER, N. H.

Hanover is a village of twelve hundred inhabitants, including four to six hundred students. It covers an area of about a mile in length and one half of a mile in width. It is on a plain whose average height above the Connecticut river is one hundred and seventy feet. This plain is quite flat except that in its southeast quarter it slopes down to a level twenty feet below the rest.

The soil is chiefly hard clay, but the southwest quarter is sandy.

Twenty years ago there was no sewer or public drain in the village except in the southeast quarter, where there were two covered stone drains. Sink water and other slops were distributed over the surface or collected in cesspools. The old-fashioned back-house had no rival and on the grounds of rich and poor bore its silent witness to the radical equality of mankind. The stone drains were ineffective and gathered filth. Of course we had typhoid fever every fall. All New England and, indeed, all the temperate zones did and still do have it. Sanitary science may eradicate it in the future; it has not yet done so. But twenty years ago the number of cases in our village was much less than in earlier times when there was a swamp back of the college grounds and other wet lands were undrained. Being on the whole a very healthy community, we might have been contented with our sanitary condition but for an epidemic of typhoid fever which occurred in 1880, during which about one hundred persons had the disease, including many students. The friends and patrons

* Read before the New Hampshire Association of Boards of Health.

of the college became uneasy. Anxious fathers were inquiring into our sanitary conditions. That useful class in the community who are set like watch-dogs to find out the faults and imperfections of their fellow men, raised a voice of sharp criticism, and all this led to an effort for improved drainage. There was no official body to do it. There was no public money for it. But the college felt that something must be done. Accordingly a paper was circulated among those citizens who generally furnished the money for public improvements, which read as follows :

"In view of the large amount of sickness that has been directly traceable to the defective drainage in certain parts of this village, it has been thought necessary to construct several large covered drains. The trustees will give a certain amount conditioned upon a like amount being given by citizens. The undersigned agree to give for this purpose the sums set opposite to their names."

Subscriptions ranged from fifty cents to three dollars. One man gave five dollars. The total was sixty-nine dollars. So small was our beginning. The college more than doubled this sum and under the direction of Prof. Robert Fletcher, now of the state board of health, and Prof. C. H. Pattee of the state college, our first sewers were laid. They put down one thousand feet of 6-inch glazed tile, and nearly the same length of unglazed tile in the same ditch to take surface water. They laid two systems which drained some wet land back of the college library; took the waste from the gas works; served the hotel whose drainage had been discharging under a large livery stable in the center of the village; drained the livery stable and stagnant pools near it, and served a number of private houses. These drains were imperfect. In a part of their course they made use of the old stone drains and they were eked out by plank drains. They terminated at the edge of the village, close to its residences on the open surface of a field. They took only surface water and sink water. We had not a water supply sufficient to flush them and consequently bath-rooms and water-closets were not thought of;

these were forbidden, too, by the nearness of the outlets of the drains to the streets. But their small service was a boon to the village. They dried the land and abolished odors and conveyed away a vast deal of filth from that quarter where there was the most sickness. Since their construction there has been no epidemic of typhoid fever and no prevalence of diphtheria among us.

No farther sewerage was attempted for eight years. We had good health and made shift to get along with our cesspools and surface drainage. We had for many years a water supply of the best quality, but it was limited in amount. Forty gallons a day was a share for a family. This was not enough to flush sewers if we had them. It was believed that sewer pipes if generally laid and used for all purposes would be simply elongated cesspools which could not be cleaned out. Some of our people preferred cesspools to sewers, because they wanted the sewage for use on their gardens. There are always good reasons for resisting improvements.

But finally a group of progressive men in the north end of the village determined to have a sewer. They formed a company of ten shareholders and contributed one hundred dollars each. They surveyed a course a little over three thousand feet long with a grade at the least of one foot in a hundred, and at most two feet in a hundred. Their outlet was in a pasture so far from the edge of the village that no nuisance was apprehended. Their ditch was about three and one half feet deep. At one or two points it was for a short distance only three feet deep. For one hundred and fifty feet going through a bank it was from eight to twelve feet deep. The bottom was carefully leveled by the engineers so as to have no sags in the pipe. Eight-inch tile was used and pains were taken to have the joints cemented tight. Written permits were obtained from private owners whose lands were traversed. T's and Y's were put in at every one hundred feet to give access to the pipes for cleaning, but no manholes were made. The whole was paid for by the capital stock and there was a remainder of one or two hundred dollars in the treasury.

Financially, this result would have been satisfactory had there been no income. Each of the shareholders got his sewerage for the yearly interest of one hundred dollars, with a small out-go for repairs added, thus far practically nothing. But at the beginning six householders entered the sewer at a rental of five dollars a year. This number has gradually increased until now there are nineteen besides the shareholders, making in all twenty-nine who enter.

The success of this enterprise disposed effectually of several bugbears that had stood in the way of sewerage in our village. First, the bugbear of expense. We thought we could not afford to build sewers. Sewerage costs now five or six dollars a year for a house, not as much as the old cesspool system cost us.

The second bugbear—we thought we had not sufficient water to flush sewers. The first sewer company met that difficulty by compelling each householder who entered to turn in his roof water. With a fall of from one to two feet in a hundred there was always a considerable stream flowing in the pipes. There has been as yet no stoppage in the main and only two or three entering pipes have been obstructed by grease. We feared that the pipes would freeze in our cold climate, as in some places they are not more than two and one half feet under the surface. But the water which feeds sewer pipes is always warm and it does not freeze when the earth is solid around it as long as there is a steady flow.

The sewer company whose enterprise has been described served only the north end of the village. The West Side Sewer Company took up the work. A householder in the west side was weary of cesspools and back-houses. He had suffered semi-annually for years the enormous nuisance incident to cleaning them. Twice a year the gases and stenches of the uncovered abominations had pervaded his premises and those of his neighbors. On one occasion they had sickened his baby. He had wearied his soul trying to get men to do the repulsive work and had paid them extortionate prices for it. How humiliating the whole matter of human excretion ! Man

spends a large proportion of his energy in defending himself against his own filth, and the degree of his civilization is indicated by the degree of his success in this contest. This householder noted that the contour of the land about him made possible a sewer; that it would not only serve him, but a considerable section in his vicinity. As he thought on the plan, its possibilities extended, and he saw with surprise how nature had prepared the way for a sewer system which reached out to a large part of the village, until he remembered that nature had been draining this plain one hundred and fifty feet above the river for ages, and that her draining had shaped the surface and made the gullies and slopes that met so well the plans of the constructor. This householder got others to join him. It was hard to secure the requisite number, for no one wanted to risk more than one hundred dollars in it, but thirteen at length came in and the company was organized. The whole undertaking was vastly simpler, of course, because the North End Company had shown us how to do it.

Several things are essential in a sewer system. First, a sufficient fall. The more fall, the better. Well constructed sewers in the city with plenty of water to flush them do satisfactory service with a fall of only four inches to a hundred feet. But it is better to make the minimum one foot to the hundred. It is convenient to follow the street, but not always possible.

Second, it is essential to get right of way through such private property as may lie in the line of natural drainage. This is often difficult; sometimes for a private company impossible. It is aggravating to have your scheme of benevolence and practical utility blocked by a contumacious landholder, but he can often do it. At one point we ran against an irritable Irishman, who filled the air with asseverations that we should not go through his land. Argument had no effect on him. There was no way around him and we were almost ready to hand our plant over to the authorities to make a public system of it and condemn the necessary land. But when they took the matter up and the Irishman appeared before them, he was sufficiently impressed to yield on condition that we pay him

certain money and give him free entrance into the sewer. At our rates this amounted to a gift of one hundred dollars in addition to the advantages which he, in common with the rest, gained from our work.

Third, the mains must be so laid that they will be accessible to the houses along the line. The main must be enough lower than the house to permit the house connections to lie far enough under ground at the start and to fall toward the main. Crossing the property of others with house connections must be avoided as far as possible.

These conditions can generally be secured by careful planning because of the fact before referred to, that unless your village is located in a swamp, the surfaces have been shaped by water, and so natural slopes for drainage have been formed.

Of course the services of a competent engineer are indispensable to perfect details.

The west side sewer had great natural advantages. For a space of one hundred feet only, the fall is but one foot to one hundred. Nowhere else is it less than two feet, and it is in parts as high as ten feet. The dish-towels and other miscellaneous articles which are sure to get in are rushed down such a slope with no delay, and the fluids have not time to freeze. A large portion of the village has natural access to it. There is over a mile of main converging to its single outlet.

And it discharges into the river. Whatever criticism may be justly made on this disposal of sewage, it is for the present the most complete and inoffensive and satisfactory. This company charges a rental of six dollars a year and its financial condition is good.

It has had but slight expense for repairs and few accidents. Shortly after it was laid there was a tremendous rainstorm which sent a torrent down the highway in which was the lower portion of our ditch newly filled. The water got started in the ditch and in a short space of time the pipe was laid bare for many rods. The highway surveyor filled that for us. We had a freeze-up in the first winter, owing to imperfection in

the outlet, but no damage was done. The sewer has been in successful use for six years.

Three other sewers have been put in since 1892 on similar plans. We now have over three miles of sewer pipes in our village, not including private connections.

Our experience demonstrates :

First. That any village may have a sewer system.

Second. That the cost of such a system to each householder is small, very little more than the cost of building and maintaining cesspools.

Third. That such sewerage diminishes sickness, especially typhoid fever and diphtheria.

While we are pleased with our progress, we are by no means satisfied. I will refer briefly to the defects of our present system. Two of our sewers discharge into the river. It is not right to defile our streams with sewage. The beautiful Connecticut should not be subjected to such base uses.

But the towns along its course are all doing it. Our sewage in so large a volume of water, about one thousand cubic feet per second, does not make any appreciable difference. True, it might make a difference to those who might drink the water below, if any disease germs, as, for example, those of typhoid fever, were contained in it. These remain active long after the water has purified itself of the ordinary filth of sewage. Such germs should always be destroyed by disinfectants before the fluids containing them are poured into a sewer, and waters of a stream into which sewage has been discharged should not be used for drinking unless it has been effectually sterilized.

This is the best we can do at present. In the future we ought to do better.

The other sewers discharge on the surface of the ground, all at a considerable distance from residences. They have, however, been complained of. The owner of the land upon which one of them discharges has protested so strongly that the company is planning a new line to empty into the river. The steady stream which issues from the outlets, gray and

foul, finds its way into the little brooks that run through pastures and meadows. It carries its odor. Where cattle have access to it, they drink it. It is offensive to owners of land and in a degree a nuisance.

The methods of disposing of sewage on the spot, which have proved practical, are: First. Broad irrigation—spreading it over the surface of lands under cultivation.

Second. Sub-soil irrigation—spreading it by means of porous drains under ground.

Third. Downward intermittent filtration, first demonstrated with success at South Framingham, Mass. This consists in pouring sewage upon sand filter beds, shifting the flow from one bed to another and so making it intermittent. The sewage is decomposed by bacterial life. This is a practicable method for any village that can find sand banks at the natural outlet of its drainage. If the sand filter beds have to be made by hauling, it is too costly for small communities.

Fourth. Bacteria beds. This is a modification of the Framingham plan of sand filter beds, the difference being that cinder or coarse gravel is used instead of sand and the action is more rapid.

Fifth. Septic tanks. These are a late device on a new principle, or, rather, on an old principle which was partially applied in the cesspools we used to have. They depend on the action of bacteria like the filter beds, but on the anaerobic bacteria (living without air). These tanks are made absolutely air tight and sewage poured into them undergoes rapid decomposition. Gases are formed which find exit through pipes above the surface of the fluid, and being combustible, maintain there a constant flame.

In either of these processes, a stream of foul and dark sewage enters the receptacles at one part, and from another side issues a stream of clear, pure water. The offensive contents have undergone chemical transformation and the purified water goes on its way.

These or such as these are the true methods. Simply to remove sewage from under our own noses, transferring it in

its noxious identity to other places, is a makeshift. It should be rendered harmless by its makers. This cannot now be done in villages because the necessity of such disposal is not sufficiently apparent to make our people willing to pay the cost. But we shall appreciate the value of sanitation more and more. Our sanitary engineers will devise cheaper processes, and the time will come when every community will reduce its sewage on the spot to its inoffensive elements.

THE PROTECTION OF DOMESTIC WATER SUPPLY BY STATUTE.*

BY JOHN C. BICKFORD, ATTORNEY AT LAW, MEMBER BOARD
OF HEALTH, MANCHESTER, N. H.

One of the absolute necessities of life, and the one in which above all others purity is of vital importance to the maintenance and preservation of good health, is the water used for drinking and domestic purposes. With the use of impure water dangerous epidemics make early and frequent visitations, and the utmost skill of our best physicians is often inadequate to stay the hand of death until whole communities are clothed in the somber garb of mourning.

Forty years ago the legislature of our state made provisions whereby pure intoxicants could be furnished to our citizens, and nearly thirty years ago severe penalties were provided for the punishment of persons who should adulterate any spirituous liquors, or who should sell any adulterated food preparation, or use in the preparation of food for others than themselves any substance injurious to health, and from time to time since numerous additions have been made to our laws designed to protect us from the use of impure and adulterated matter in our food, and state officers have been vigilant in the prosecutions of the vendors and users of oleo and other imitations of genuine food supplies, regardless of the fact that chemical analysis showed them to be as healthy as the article they were supposed to represent.

Stringent and effective laws for the protection of property rights in every direction, from the peculations of the crow and woodchuck upon the crops of the farmer to the granting of

* Read before the New Hampshire Association of Boards of Health, June 30, 1898.

the right of eminent domain to manufacturing corporations, have been enacted, and pages in our statutes have been devoted to the preservation of fish and game in the interests of our sportsmen, and general and special legislation has been had for the promotion of almost every private interest, while our schools and public institutions for the development of the mind and preservation of our morals have received year after year due and liberal attention. But the protection of the purity of that which should constitute at least one half of the sustenance of the human body, was not considered of sufficient importance to demand direct legislation until 1885, and then eight lines contained the substance of all that was deemed necessary for the protection of the public health in preserving the purity of the waters in the reservoirs from which cities, towns, and villages obtain their water supply for domestic uses, and today the gist of the statute law relating thereto is found in section 13 of chapter 108 of the Public Statutes, which reads as follows: "If a person shall place, leave, or cause to be placed or left, in or near a lake, pond, reservoir, or stream tributary thereto, from which the water supply for domestic purposes of a city, town, or village is taken in whole or in part, any substance or fluid that may cause the water thereof to become impure or unfit for such purposes, he shall be fined not exceeding twenty dollars, or be imprisoned not exceeding thirty days, or both."

In 1891 a special act was passed by the legislature for the protection of the waters of Lake Massabesic (from which Manchester obtains its water supply) from sawdust, and in 1895 a general law was enacted for the protection of the purity of ice used for domestic purposes as well as water, and giving certain powers to local officers to make reasonable rules and regulations regarding the same.

Power has been given by statute to state and local boards of health to make such rules as they deem necessary for the protection of the public health, and when properly approved and promulgated they became in a certain sense laws binding upon the public, and are respected and obeyed by a portion of

the people as such, and those relating to the subject herein mentioned do good work in preserving the purity of the water in our reservoirs and maintaining cleanliness on the premises adjacent thereto.

Nevertheless, they fail to impress the would-be wrongdoer with the dignity and power of a statute enacted by legislature, and prosecutions for the violation of such rules are attended with difficulties which do not arise where the provisions and penalties are provided and plainly set forth by statute law.

In the former case the legal establishment of the rules must in each case be proven in court, and must be proven by record, and it must be shown that the law has in all its various requirements been complied with, and not only that, but the fact of whether the rules are reasonable or not may be questioned; if not by the justice of peace or the police court, it may be raised on an appeal to the supreme court, which is, as perhaps it should be, always jealous in guarding the rights of the individual, and seldom, if ever, overlooks a flaw in the adoption of the rules of local boards or the enactment of local ordinances, and in doing this the court simply does its duty: for no man should be punished by illegal process, or for the violation of a law that was not legally adopted, and when, as it oftentimes happens, legislative enactments which have been given due and careful consideration by the best legal talent of our state fail to stand the test of the judgment of the supreme court, it is no wonder that the rules and regulations of our cities and towns and the local boards thereof are often found defective and of no avail.

Difficulties in the protection of water reservoirs by local boards of health may arise in various ways, one of which might be the fact that the boundaries and tributaries to such reservoirs are in different towns, and consequently under the control of two or more local boards, having widely different rules and regulations.

The city of Manchester furnishes an illustration of what might, but which happily does not, exist to any serious extent. As I have already stated, the water for our city is taken from

Lake Massabesic, the larger portion of which is located in the town of Auburn, and consequently in another county, and on the shores of the lake there are more than a hundred cottages used by their owners as residences (or rented to others) during the heated term, and many of them are used as places of recreation during the whole year.

The boards of health of Manchester and Auburn happily have no differences of a serious nature, and are united in a desire to preserve the purity of the waters of the lake, and have each adopted a code of rules, which, if strictly enforced in the spirit of their full meaning, would prevent the pollution of the water to any appreciable extent. But suppose the board of the city of Manchester had adopted the code of rules now in force, and the board of the town of Auburn had said these rules were too stringent, "that sink water on the Auburn shores will not affect water taken from Cohas brook (the location of the intake of one of our daily supply reservoirs), and that a pigpen on Severance Beach will not trouble the water at the Bog pumping-station (the place of intake of the other supply reservoir), or that a dead horse in the brook at Auburn village will not affect the taste of water in the Oak Hill reservoir," how far could the board of health of Manchester by their rules protect and preserve the purity of the water?

The statutes hereto recited might afford a remedy, but proceedings under the rules of the Manchester board of health in a legal prosecution would need the sympathy of the court or justice to give the desired relief, and then if the respondent was alive to his rights (as most violators of such rules are), they would have to stand the test of the supreme court at a trial term and perhaps the consideration of the full bench before definite conclusions were reached, making the settlement of the question tedious as to time, and expensive in money.

There are no sinners more difficult to deal with than those who sin just a little, and who in reality mean no harm. It is more difficult to convict a person violating the rules of the board of health or the ordinances of a city or town than it is

to convict a midnight burglar. The first is often and perhaps usually a "good fellow," and what he has done would not in itself work any great injury. He is eminently respectable, and on the whole a law abiding citizen. He believes he is just as good and has the interests of his fellow men as much at heart as the members of the board who made the rules. The rules were not made for him, "but for disreputable fellows" (and the rules are only what three men who appear to him to be cranks have made, and ought not to apply to him). "Why have these cranks made rules that no one shall bathe in the lake? What harm can there be for my boy or myself to take a dip on the Auburn shore? We don't go in to wash ourselves, but simply for recreation. Such rules ought not to apply to us, to respectable people, but to the filthy creatures, the tramps and vagabonds, who soak their filthy bodies but once a year. They should be imprisoned and punished."

With this feeling existing, local justices are timid in vigorously applying the penalties to their neighbors and friends. But the burglar perhaps endangers life and converts to his own use the property of a single individual, and when once found or suspected, every man's hand is against him. He attracts no admirers by his shrewdness and has no sympathizers on account of his misfortune. His gentlemanly behavior affords him no relief, and there is no leniency because he stole what could best be spared. There is no palliation of his crime and the entire public is anxious for vindication of the law. The statute law has been violated even if he did not succeed in obtaining the value of a single cent. He is punished for the intent to steal.

If the protection of property was left simply to rules that might be laid down or promulgated by a board of censors created as are our boards of health, the whole community would demand explicit statute laws for the protection of their goods and chattels, laws that it was the duty of every man to lend his aid to enforce. Why, then, should not certain, definite, and explicit laws, applicable to all reservoirs of water designed for the use of the public for domestic purposes, be placed on

our public statutes? It is true that the right of eminent domain has to a certain extent been conferred upon the water board of the city of Manchester, whereby the city may obtain ownership of land adjacent to the lake. The process, however, has not thus far met with great success, and it involves an expense of litigation both to the city and the landowner which ought not to be borne by either, and then the premises are only protected by rules and regulations of the local boards except so far as a trespass may be punished by suit. While this may be of value to Manchester, regulations regarding the use of the shores of any such water reservoirs for a certain distance from high water mark, enacted by the legislature of the state, would be of much greater utility than rules promulgated by the state or local boards of health, or by boards of water commissioners, which may prescribe different rules for the protection of one and the same reservoir. I believe we should have certain, well-defined general laws placed upon our statutes which every man is bound to know, and the ignorance of which furnishes no excuse for their violation. I would regulate by statute the distance from the high water mark of such reservoirs, that buildings should be erected or maintained, also grounds for the protection of the tributaries of such reservoirs, and provide for the removal of such buildings as might prove a source of danger to the water with, of course, suitable recompense to the owners.

Life may be cheap, but good health is dear to every one who lives. Let me be well while I live and have the strength and power to work till death shall place his iron hand upon my throat and say, "I want you now," and I will not complain. But spare me from a lingering disease and living death, the results of impurities in the necessities of life, from the work of insidious germs that sap the vitals and eat out the core of strength, and end in ghastly, hideous, lingering dissolution.

That fate is coming to human beings about us every day. How much of it is due to the impurities in food and drink we cannot tell, but what we know is harmful to the human system, that which must do harm to those who cannot help themselves;

that which will sap the constitution, breed fevers, pestilence, and death, let us have the strong arm of law enacted by the legislature of our state to crush out, fortify against, and prevent its doing its destroying work, and if forty years ago it was necessary to enact laws to give the people of our state pure rum, let us in these days have laws upon our statute book that shall insure to our wives, our children, and those whose good sense teaches them to shun "the cup filled with the liquid of the sunset red," the crystal water, pure and sweet from Nature's cleanly hand. To this end let state and local boards of health apply their earnest thought and work; let them meet and form such a code of laws as will protect each lake and stream that supplies a city, town, or village from impurity and contamination, and then let each local board see that their members of the legislature know the merits of the bill.

The legislature of our state is not lacking in a desire to protect the people from any and all danger, whether it be that of the armed foe in battle array or the insidious enemy that does its work unseen by the human eye, until the poison has done its awful and too often deadly work, and I believe it will gladly and expeditiously take this matter under consideration and enact such general laws as will in a measure give the desired relief.

SOME OBSERVATIONS ON BOVINE TUBERCULOSIS IN NEW HAMPSHIRE.*

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In order to show in part the experience and observations upon which some of the conclusions of this paper are based, a brief history of the official recognition of bovine tuberculosis in New Hampshire is necessary.

In 1891 the legislature enacted a law creating a state board of cattle commissioners, and also provided in the organic act that the secretary of the state board of agriculture, the master of the state grange of Patrons of Husbandry, and the secretary of the state board of health should, *ex officio*, constitute the board.

The act carried with it an annual appropriation of ten thousand dollars, and gave the board ample authority and power in every particular to take such action as it might deem best in its efforts to suppress the disease.

In the organization of the board the secretary of the state board of health was made president, and the secretary of the state board of agriculture secretary and executive officer, and as both of these were already salaried officers of the state, no draft has ever been made for salaries upon the annual appropriation of the cattle commission, except for the services of veterinary surgeons and for clerical work, so that the greater bulk of the appropriation has been available to pay indemnities for cattle destroyed.

* Read at the Twenty-Sixth Annual Meeting of the American Public Health Association, held at Ottawa, Canada, September 27-30, 1898.

During the first two years of the work of the board the outlay was small, for the reason that the law provided that all animals destroyed should be paid for at their value in the diseased state. As the board took the ground that a tuberculous animal was practically worthless, small awards were made, and for this reason it is probable that some cases were concealed which would have been brought to the notice of the board had the compensation to the owners been greater.

In 1893 the legislature amended the law by providing that all animals destroyed by order of the commission should be paid for at one half the value of the animal in health.

Among the rules adopted by the board was one requiring that all applications for the examination of animals should be made through the selectmen of the respective towns. The board also established a quarantine against cattle from Massachusetts, because it was the practice to send many herds from that state annually into New Hampshire for pasturage, and it was found that by far the greater prevalence of bovine tuberculosis was in that section of the state so used for pasturage. As a result of the quarantine regulations it was found that from 8,000 to 10,000 cattle were brought annually into the state from Massachusetts, and subsequent investigations of the board showed that very frequently tuberculous animals were disposed of for a few dollars in New Hampshire, and not taken back to Massachusetts, thus accounting for the large number of cases in that particular district. Later quarantine was enforced in all cases where animals were brought into the state.

The people of the state, through the publications of the state board of health, the state board of agriculture, the state grange, and addresses at agricultural and dairymen's associations, became comparatively well informed regarding this disease, as was shown by the fact that in 1895 the legislature of the state passed, almost unanimously, a bill appropriating \$100,000 for the use of the state board of cattle commissioners, with which to begin a systematic examination of all the cattle in the state, and for the destruction of all those

found to be tuberculous; but the governor vetoed the bill. These facts are given in order to show how much interest has been taken in this work, and are the foundation of our belief that the cattle owners throughout the state, almost without exception, have asked for an investigation whenever they have suspected tuberculosis in their herds.

From the organization of the board, in 1891, to September 1 of the present year, the commissioners have examined 1,846 herds of cattle, the total number of which, although not recorded, represents many thousands of cattle. From this number 1,483 cattle were destroyed by order of the board, of which 296 were condemned upon the tuberculin test, and 1,187 upon physical examination. The tuberculin test has been applied to 1,362 cattle. It should be borne in mind that examinations have been made only in cases where the disease was suspected, and upon application therefor.

Fourteen hundred and eighty-three post mortems were made, or, in other words, every creature killed was examined. Of this number evidences of tuberculosis were found in 1,478, leaving only five cases in which the disease was not discovered.

The statement sometimes made that bovine tuberculosis may be eradicated is not borne out in practical dealings with the disease, or from any point of view, except the theoretical one that it would be possible under certain conditions to destroy all tuberculous germs. It is as well first as last to abandon the idea that tuberculosis in cattle will be eradicated, and direct our energies to reducing the disease to the lowest possible degree. In order to stamp out the disease entirely it would become necessary to destroy all tuberculous animals and persons, and to hold all others in strict quarantine until all the existing germs of the disease were destroyed.

Suppose it were possible in a single year to destroy every case of bovine tuberculosis and to disinfect every stable, how long would it be before re-infection would take place through tuberculous persons?

We believe that if the state would maintain sufficient supervision over its cattle to destroy all cases of tuberculosis that

could be detected by a careful and thorough physical examination by competent veterinary surgeons, the danger of infection from tuberculous meat and milk would be reduced practically to a minimum. This is a work, too, which would be practicable in every state and which could be carried on without extraordinary appropriations.

That this can be accomplished chiefly by a physical examination of the suspected animal, is a conclusion which we have arrived at almost wholly from our own experience. The first two or three years' work of the board was conducted entirely through physical examinations. Later we adopted tuberculin as a diagnostic agent in 1,362 cases, and 296 cattle were condemned on the evidence of the reaction from this agent. A very large per cent of these cattle, as shown by post mortem examinations, were in our judgment so slightly affected as not to be an element of danger to the community; while those that were so far diseased as to lead to the belief that they should be included in the really dangerous class, could have been diagnosed by physical examination. We, therefore, suspended the use of tuberculin, except possibly in an occasional case, for the purpose of corroborating a diagnosis already made.

As already stated, we believe that a majority of the cattle reacting to the tuberculin test are not diseased to an extent that requires their slaughter for the protection of the public health. This conclusion has been arrived at, not only by the cattle commissioners of New Hampshire, but also by Massachusetts and Connecticut, at least, of the New England states.

Massachusetts up to the present year had expended the enormous sum of \$700,000 in the destruction of tuberculous animals in that state, condemned largely through the tuberculin test; but this policy has been entirely abandoned, and the position taken by New Hampshire is indorsed by Peters and other prominent authorities who were formerly strong advocates of the slaughter of all animals that reacted to tuberculin.

Under this test we have destroyed many animals in which only the slightest evidences of the disease could be discovered, as, for instance, a single gland in which the tubercular process

was barely discernible; in others, a single gland, or more, enlarged, filled with cheesy matter and already taking on calcification; and in still other cases, complete calcification or encystment had taken place.

It is a well known fact that tuberculin does not in the least reveal the degree of infection. Experience has also shown that it is not so reliable a test as was formerly supposed. Salmon admitted some five years ago* that while "tuberculin is a great aid in the diagnosis of tuberculosis, it is not infallible, and may lead to some errors."

Prof. James Law, than whom no man in this country has done more to encourage the use of tuberculin and to cause others to place implicit faith in it, has recently written a paper on "Tuberculosis in Cattle and Its Control," published as a bulletin from the Cornell University Agricultural Experiment Station, which is a remarkable modification of his former views in regard to this disease. In this paper he cites eleven conditions under which tuberculin as a diagnostic agent is unreliable. This admission shows how impossible it is to detect, by any known agent, every infected animal in a herd.

Professor Law admits that tuberculin has been objected to because it detects, under favorable conditions, even the slightest and most latent cases of tuberculosis, some of which would recover and many would remain useful for years; and, also, "if the latent cases are to be retained in the herd and the advanced cases only removed, then truly tuberculin should have no place in your system; physical examination should be all-sufficient for your purpose."

The paper itself is one from which an argument may be made almost as well in favor of as against the use of tuberculin, from whichever point of view one prefers to look at it. He cites examples of the successful extinction of tuberculosis in infected herds through physical examination and disinfection, sufficient to satisfy the most critical, the proof of which was in the final subjection of all the animals to the tuberculin test, with the result that not a single case was found, and this

* Transactions of the American Public Health Association, 1893.

in a herd of about two hundred head of cattle, 50 per cent of which had been condemned upon physical examination.

In our own experience we have found instances in which tuberculosis existed, although the animal did not react to tuberculin. As an illustration: On May 2, 1896, we were asked to examine a herd of cattle in the city of Rochester, upon a farm where, a few years previously, an entire herd of forty animals had been destroyed under the tuberculin test. The herd consisted of seventeen cattle, fifteen of them reacting to the tuberculin test; but the entire herd was destroyed, and the two that did not react were found to be tuberculous like the others. A sufficient number of experiences of this kind have occurred in our own work to show that this agent is by no means infallible.

As the most efficient means of preventing the spread of tuberculosis, the conclusion has been forced upon us that sanitation must rank first. Whenever we have found tuberculosis to exist extensively in a herd of considerable proportions, we have invariably found one of two conditions in connection therewith, to wit: That the animals were stabled in close quarters, with an entire absence of proper ventilation and cleanliness, thereby maintaining an atmosphere so warm that the temperature rarely reached the freezing point in mid-winter; moist and charged with the effete stable products, thereby creating the very best possible conditions for the tubercle bacillus and its diffusion among the animals. Or, second, a degree of in-breeding among some of the thoroughbred herds that in all probability impaired the powers of resistance and rendered these animals particularly susceptible to infection.

It is a very common occurrence to find stables constructed with a deliberate purpose to retain the animal heat, without any attention to ventilation or other sanitary conditions. Under such circumstances, once infection is introduced into the herd, even though the diseased animals are destroyed as soon as discovered, disinfection of the stables sufficient to destroy the germs is next to, if not quite, an impossibility. The remedy lies therefore, as far as this phase of the question is

concerned, in educating the farmer and stockraiser along these lines, and to show him that the best protection he can give his herd, not only against tuberculosis, but against other diseases from which cattle occasionally suffer, lies in sanitation.

Imagine what it means when we speak of disinfecting a stable constructed in this way with a cellar or basement, damp in itself, never exposed to the sun, into which all the excrementitious matter of the stable is deposited. Imagine such a stable thoroughly infected with a germ which we are told lives almost indefinitely under conditions of moisture associated with nitrogenous matter, the latter of which has accumulated everywhere in the stable, not to speak of the great masses of material gathered in the cellar. Disinfection under such conditions would be only partial at the best, and might or might not protect animals introduced into such a stable, even if not for two or three years afterward. The complete eradication of the tuberculous germ from an infected stable, except through absolute abandonment for a series of years, is very improbable, especially under unsanitary conditions.

On the other hand, we believe that if particular attention were given to the sanitary construction and care of stables, the danger from the spread of the disease in a given herd, even though a tuberculous animal were in it, would be relatively small. This premises a stable in which there is sufficient cubic space per creature, with ample ventilation, light, and dryness, all of which conditions are attainable in most localities. With stables kept in a thoroughly cleanly condition, frequently swept and washed, with the addition of some disinfectant and the segregation of animals discovered to be diseased, we believe the spread of tuberculosis would be practically nil.

It is in this connection that we wish to present some evidence corroborative of the assertion that the disease may be arrested, based upon an experiment made by the New Hampshire cattle commissioners during the present year.

June 12, 1897, a herd of thoroughbred Holstein cattle were examined under the tuberculin test, twelve of them failing to

pass. Two of these were in an advanced stage of tuberculosis, and were destroyed. Of the remaining animals, one was a thoroughbred Holstein bull, weighing over two thousand pounds, and all were under four years of age. All these animals were tested with tuberculin September 12, December 9, February 23, and on May 9 those that were living on that date were again subjected to the test.

Five of the ten animals passed the test of September 12, and five, including the bull, failed to pass. Owing to the inconvenience of keeping the bull and the supposition on the part of a few people that he was badly diseased, he was killed soon after the test in September, although there was no indication of the disease upon physical examination. The post mortem revealed only the slightest evidences of tuberculosis.

The nine remaining animals were placed upon an isolated farm, where they were given proper sanitary care, including good ventilation, light, and moderate feed. They were kept in the open air day and night, except in stormy weather.

As a result of the test of December 9, only three of the animals reacted, and in one of these the disease was sufficiently developed to be detected by physical examination. These three animals were again tested on February 23, with no material change, and on March 29 were destroyed, the one condemned upon physical examination proving to be a well-developed case of tuberculosis. The other two killed at the same time exhibited no external evidences of the disease, and only the slightest traces were found upon a most thorough post mortem, the condition being such as to lead to the belief that the disease was not only being reduced, but was on the way to ultimate recovery.

The six remaining animals were tested with tuberculin February 23 and May 9, and each time passed the test successfully. Upon physical examination they appeared to be in perfect health, and a little later they were returned to the original owner, who was a cultured and wealthy business man, and who was perfectly satisfied with the result of the examination. The action of the board was, however, criticised in certain

quarters, undoubtedly for special and individual purposes, and we therefore determined to destroy the animals and make a careful post mortem examination, in order to determine whether or not our conclusions were correct. Accordingly in August they were killed, and an autopsy made in the presence of the commissioners, a competent veterinary surgeon, and several witnesses, with the following results:

A careful autopsy was made in each case. All the internal organs were searched for evidences of disease, which were found only as stated below:

No. 1. (3790) A small encysted mass, as large as a medium-sized walnut, was found near the apex of one lung. Two of the bronchial glands were somewhat enlarged and filled with caseous matter of a thick consistency. These were the only lesions found. No evidence of recent inflammatory action or pus. All the other organs were in a healthy condition.

No. 2. (52) Two of the bronchial glands were enlarged and filled with caseous matter. On a small portion of the left lung, adjacent to the fifth rib, were found granulations, probably miliary, and which also appeared in a small patch on the ribs contiguous to the granulations on the lung. No inflammatory condition existed, and no other evidence of disease was found.

No. 3. () Bronchial lymphatics slightly enlarged and containing a small amount of cheesy material, apparently encysted. No other evidence of disease.

No. 4. (366) A small nodular, encysted mass, of the size of an ordinary marble, was found in the apex of one lung. No other evidence of disease.

No. 5. (363) In one of the bronchial glands was found a small mass of caseous matter, cylindrical in shape, about one eighth of an inch in diameter and more than an inch in length, partly calcified. No other evidence of disease.

No. 6. (362) In the upper part of one lung was found a caseous deposit, encysted, the size of a small walnut, with some calcification. In the lower part of the lung was an encysted nodule, about the size of a small cherry, containing caseous matter. No other evidence of disease.

In all the above-mentioned cases a careful examination was made of those organs most likely to be tuberculous, including lungs, liver, heart, stomach, bowels, kidneys, uterus, mammary glands, mesentery, lymphatic, and pigmentary glands,—in fact everything except the brain and spinal cord, which it was not deemed necessary to explore.

All the cows were in an excellent condition and probably would have passed through most, if not all, slaughtering houses without any disease being discovered, with perhaps the single exception of case No. 2, in which the granulations upon the lung, being upon the outer surface, were apparent upon the removal of that organ.

In not a single case was there any evidence of active tubercular progress; no inflammatory condition existed in any of the creatures, and no pus; neither was there any evidence of a breaking down or softening of the caseous matter of the glands. In other words, the general appearance was that of an arrested progress of a condition which at some prior time of infection had caused serious local trouble in the circumscribed localities mentioned. So excellent was the general condition of all the animals that it would have been absolutely impossible for a veterinary surgeon to discover by physical examination the least evidence of disease.

If the tubercular process was arrested, as appears to have been the case, we can see no reason why the cows might not have died of old age, had they not been slaughtered. Certainly if the tuberculous material had become encysted, as was found to be the case, and slow calcification was taking place, it is more than probable that no serious disturbance or further infection would have occurred from these practically isolated products and results of a former active morbid process. This would apply to all the cases and conditions found, with the exception of the one in which the granulations existed. Whether the cell proliferation had ceased, is a question which we are unable to answer, although the appearance of the granulation was of a limited and atrophied nature, rather than of an active growth.

A similar experiment was made in 1895-96 at the Maine Agricultural Experiment Station* with very similar results. A herd of ten cows and heifers that reacted to the tuberculin test were kept under observation, the last until October, 1897, each of them being subjected to frequent inoculations with tuberculin, and occasionally reacting.

Without giving a complete account of the treatment or a detailed report of the autopsies, it is sufficient to say that in five of the animals, or 50 per cent, the disease was held in check, so that it made practically no progress. In three others a little advancement was made, and in two cases the disease had nearly reached a fatal termination when the animals were killed.

Judging from the autopsy records, there seems to be no reason why the five animals in which the disease was arrested might not have continued in good health.

As may have been inferred from the tenor of this paper, we believe that the danger of infection from bovine tuberculosis has been greatly overrated. On this point our own views have undergone a somewhat radical change from those already on record, brought about by evidences which cannot be fully discussed at this time. We are convinced that whatever danger exists arises almost entirely, if not wholly, from those animals in which the disease is so far advanced that it may be detected by a competent veterinary surgeon upon physical examination, barring, possibly, the localized appearance of the disease in the udder, in which event the tuberculin test would determine the diagnosis.

It may be stated in this connection that the veterinary surgeons employed by us have become wonderfully expert in the physical diagnosis of tuberculosis after a little experience.

By what means those animals which we consider dangerous to the public are to be detected and destroyed, is a problem which will doubtless have to be settled differently in different sections. In our own state we believe that the dairymen and stockraisers have such a wholesome fear of their herds becoming infected that they report at once even a suspicion of the

* See Annual Report of the Station, 1897.

disease, and then such suspected cases are examined by the commission.

But we believe that this matter should not be left wholly to this method of detection, but that a law should be enacted providing for the registration of all dairymen—in fact, of every man who sells milk; that the state should be divided into districts and that an inspector be appointed for each district, who should make occasional inspections under the direction of the state board of cattle commissioners, report the condition of all herds examined, and give instructions to dairymen, by circulars and otherwise, on the necessity of maintaining sanitary conditions and how to do it. The registration fee should largely, if not wholly, meet the expenses of the district inspections. Also that slaughtered animals should be inspected before being sold. Under some such system as this we believe the disease could be reduced to very small proportions, and that, too, without extraordinary state appropriations.

In conclusion we present the following propositions:

1. That it is impossible to eradicate bovine tuberculosis; but that it may, without inflicting too great a burden upon the state, be reduced to a degree that will subserve the interests of the stockraisers and likewise protect the public health.
2. That but a very small percentage of the animals infected with tuberculosis in any way endanger the public health, and that an indiscriminate slaughter of the cattle reacting to the tuberculin test is wholly unnecessary, inasmuch as many of them either recover or the disease is permanently arrested.
3. That a proper sanitary condition of stables and stable inclosures would do more toward preventing the spread of bovine tuberculosis than any other measure that could be adopted.
4. That the danger of infection from bovine tuberculosis may be reduced to very small proportions, if not wholly eradicated, by sanitary measures, inspections, and physical examinations by the state, in co-operation with local authorities.
5. That such inspections, once inaugurated, could be maintained without an expense that would be burdensome to the state.

ALMSHOUSES.

BELKNAP COUNTY ALMSHOUSE.

This institution is located in the suburbs of Laconia, a little more than a mile from the railway station, and is well situated for an institution of this kind. It consists of an almshouse and county jail, with stables and an adjacent building, the upper portion of which is occupied by the chronic insane.

This institution has been materially improved during the past few years, and is now, with a few minor exceptions, suitable for the purposes of the county. The main house is in good condition, has an abundant supply of good water and is well heated. The old method of pumping water into large tanks in the attic of the main building by wind power is still maintained, although the institution is connected with the city water service, which gives good hydrant power; but as the water is metred to the almshouse, the maintenance of the old system is a large saving to the county in water rents. This plan necessitated the double piping of the house. Some of the old pipes are defective and should be replaced.

It is understood that the commissioners recommend that a boiler house be erected outside of the main building. Aside from the danger from fire, the present system is inconvenient by reason of the overheating of a portion of the house, especially in summer, as a fire is maintained constantly to produce steam for cooking purposes. We would recommend that such a house be erected in the near future, and that the county convention make an appropriation therefor.

The institution at the time of the summer inspection, August, 1898, contained a total of seventy inmates, including ten prisoners in the jail, nine insane persons confined in an out-building, and four young children.

The jail was in a fairly good condition, with the exception

that some repairs, which we understand have been provided for, were needed, for instance: two of the doors to the cells were defective, as was also one water-closet.

The jail contains fifteen cells and a bath room, with a water-closet in each cell. Some of the prisoners appear to take pride in keeping their cells in good order, while others were more or less careless in this respect; but on the whole the condition was very good.

The facilities provided for the care of that class of the insane which it is necessary to confine more or less are not what they should be. We called the attention of the county to this fact in the thirteenth annual report of this board, as follows:

"The building used for the insane is not a suitable one. For these patients ten rooms, including a bath room, were fitted up in the attic of a building occupied for the laundry and the woodshed. There are many objections to this plan, and we would suggest that the county take into consideration at the earliest practicable moment the need of erecting a new building for this class of patients."

There were confined in this place at the time of inspection four men and six women. It is but justice to the attendant to say that these quarters were found to be clean, more so than would be expected in such a place, and everything indicated the utmost attention and care of all details pertaining to cleanliness on the part of the man in charge.

The county should construct a new building for its insane, with separate wards for the two sexes. Such a building as the county needs would not be very expensive, and would not only provide better quarters for this class of inmates, but they could be cared for with much less labor. Connected with such a building should be an ample yard for those whose liberty is restricted.

In this connection we would also recommend an inclosed yard of ample size for the recreation of the females of the almshouse proper, among whom there are many who are irresponsible in almost every particular.

CARROLL COUNTY ALMSHOUSE.

Visited this institution October 21, 1897. Number of inmates, sixty. Number of insane, only one confined in the asylum, but there are nine who are considered to be demented, but during the day they are about with the other inmates. There are seven children in this institution, three of whom are under five years of age, and four between five and ten. Three of these children were born in the institution.

The inmates seem to be well cared for. The buildings are neat and clean, the floors of every room except the dining-room having a coat of paint. The building is heated by steam and has a good water supply, but no means of putting out fire except stand-pipes and hose within the building; no hydrants on the outside of the buildings.

The jail of Carroll county is connected with this institution, and within the last few years an entrance and exit has been made at that end of the building, so that in case of fire the inmates might be removed. There is no house of correction in Carroll county.

The dormitory for the men is a single room in the attic, which is well warmed and ventilated.

CHESHIRE COUNTY ALMSHOUSE AND ASYLUM.

This institution is located in Westmoreland, and, like two or three others in the state, is not very convenient to railroad facilities. However, as far as the location itself is concerned, the buildings are delightfully situated on the Connecticut river, and the farm is perhaps unsurpassed by that of any other institution in the state.

The buildings consist of the superintendent's house, a large almshouse, two asylum buildings, one for men and the other for women, and a work-house, besides barn, stables, and necessary out-buildings.

On the average there are about one hundred inmates, including prisoners and the insane. The main house, which is

built of brick, is ample for the pauper classes of the county, and is in a very excellent condition throughout.

The building for insane men, which was built several years ago, and which was described in a former report, at the time of inspection contained seven inmates, constantly confined, while some others who are more or less responsible, and able to labor, sleep there. This building is of brick, suitably divided into rooms, closets, bath room with hot and cold water, etc., and is in a good condition generally. About the time this building was erected, we expressed the opinion to the county commissioners that it would be entirely inadequate for the needs of the county. This prediction proved to be correct, and during the past two years the county has erected another building, for insane females, which is a model of its kind and which reflects great credit upon the county. This building was constructed of brick with granite trimmings, and is finished throughout with wood in its natural color; it is connected by a bridge with the other asylum building. There are twenty-eight rooms in this building, twelve on each floor and four in the attic, besides a large hall which is being finished in the attic for a chapel.

All the cooking for the institution is done in one general kitchen, but this new building has a sink, dish-closets, and closets for clothing, in which each patient has a compartment for her clothing and personal effects. There are water-closets and bath rooms on each floor; also on each floor one large room which answers for dining and sitting-room. In each room there is one bed and a radiator; the bedsteads are of iron, with good springs and mattress.

In the basement of the building is the laundry, the ironing room, etc. At the time of the inspection nineteen women occupied this building.

The building occupied by the prisoners contains six rooms on the first floor and two above. The building is well equipped and, like all the others of the institution, is heated by steam. In the basement of this building is the boiler for heating and cooking purposes.

The water supply has been somewhat short during the past year, owing to the failure of a dam. The difficulty has been remedied, and it is expected that there will be an abundance of water in the future. There are three outside hydrants, with an ample amount of hose and sufficient power to throw water over all the buildings. There are also five inside hydrants. The buildings are well painted and present a neat and clean appearance.

COOS COUNTY ALMSHOUSE.

This institution is located at West Stewartstown, within half a mile or less of the railway station. During the past few years this institution, like many others of the same character in the state, has been greatly improved throughout. The main building, which was originally a farmhouse, has been from time to time remodeled and repaired to the extent that it now constitutes a very comfortable almshouse for the county.

All the buildings are heated by steam, and the rooms were found to be neat and clean—in fact the general cleanliness of the buildings was all that could be asked. The floors and walls were in good condition, the latter being frequently painted or whitewashed.

The institution contained at the time of inspection seventy inmates, twenty-two of whom were classed as insane.

A few years since the county erected an additional building for the insane, connected with the main house by a long covered passageway. In the construction of this building due reference was given to the comfort of the occupants, the plans having been approved by the state board of health, and it may be said without contradiction that, relatively speaking, the accommodations provided by this county for its pauper insane are not excelled by any in the state. The halls are sufficiently large for general exercise, while the rooms are ample in size. The entire building is finished in hard wood, well heated by steam, and lighted by electricity, as is the entire institution, including stables and out-buildings.

GRAFTON COUNTY ALMSHOUSE.

This institution, located on the line of the Boston & Maine Railroad, about two miles from Woodsville, has a little station of its own, at which way trains stop. Within a year a side track has been put in, so that coal and other freight for the almshouse is now delivered directly to that institution, instead of being transported by team two miles, from Woodsville, as formerly.

At the time of this inspection the institution contained 103 inmates, twenty-four of them being classed as insane and occupying the wards for the insane.

The almshouse proper has been considerably improved during the past year, by the laying of hard wood floors, sheathing the walls of the halls, and the papering and whitewashing of rooms, so that at the present time the building presents a better appearance than ever before. The entire house was neat and clean in every part and reflected great credit upon the matron, Mrs. Phillips. Many of the inmates take care of their own rooms and take great pride in keeping them tidy and clean.

The inspector arrived unexpectedly at the almshouse a short time before supper was served, and thus had an opportunity to see the tables as they are laid daily, without any preparation for inspection, and it can be safely asserted that many a farmer in New Hampshire sits down to a table less abundantly supplied than that presented to the inmates of this institution. The cooking was first-class in every particular, and the quantity was ample. The commissioners stated that they had found it to be better economy, and more satisfactory in every way, to buy supplies of good quality only.

The buildings were found to be in a fairly good sanitary condition, and the water supply, which a few years ago was totally inadequate, is now abundant, with a pressure sufficient for fire purposes, as was fully demonstrated during the past year, when a fire broke out in the roof of the main building, and, although it had obtained considerable headway when

discovered, was readily extinguished with water from the hydrants.

The asylum for the insane contained twenty-four inmates; nine men and fifteen women. Some of the men are able to work on the farm, but most of the women are totally irresponsible, and have to be confined constantly in their rooms. This asylum has an unusually large percentage of exceedingly bad cases.

This institution has a modern watchman's clock, with ample stations, which keeps the watchman on active duty all night, as each station in the building must be rung in every hour, and from the stables every two hours, during the night. The latter service is perhaps more to ascertain if the cattle and horses are all right than for any other particular purpose, inasmuch as the farm has more than one hundred cows, and a dozen or fifteen horses, besides from one hundred to two hundred pigs and hogs. A large barn, with a basement under the whole of it, was built during the past year.

THE JAIL.

At the last session of the legislature the county convention appropriated \$12,000 for the purpose of building a jail for Grafton county, to be located near the almshouse, so that both institutions might be under the management of one superintendent. The county commissioners were authorized to issue bonds for the purpose of obtaining funds to build the jail.

The building is now substantially completed. It is almost entirely of brick, and in the jail proper there is no wood whatever. It is two stories in height. The jail is entered by an ample hall, with stairway to the second story, and beyond the hall is a fair-sized room, suitable for an office or for a private room for the jailer. In the second story there is a hallway and a large room corresponding to the one below, which is designed for female prisoners, if such there should be, or, if not used for that purpose, it might serve as a hospital in case of illness among the prisoners.

From these two hallways the jail proper is entered, through

a solid steel door. There are two tiers of cells, one above the other. On each floor there are four cells and a bath room on a side, all of which are protected by a steel grating in front of the cells and at a distance of some three feet and a half, thus leaving a corridor for exercise, and to which even the worst class of criminals might be safely admitted, for if they should by any means get outside of this steel grating they would yet be secure by reason of the grated windows of the building.

The cells, which are of fair size with walls of plate steel, contain, each, two swinging frames for cots, a set washbowl, and a water-closet recessed in the rear wall, with a sliding door which secures it from observation when closed. The cells on the upper floor are constructed exactly the same as those below, with the exception that four of the cells above are built of Bessemer steel, and it is believed that from these the most adroit jail breaker could not escape. All the closets are automatically flushed and the institution has been carefully plumbed with the best fixtures. It is heated by steam, and the test of the past winter shows that the heating apparatus is ample for the building.

With two persons in a cell there are accommodations for thirty-two male prisoners. At the time of this inspection the jail, although completed, was not occupied.

The commissioners are to be congratulated upon having completed this jail at an expense of only about \$10,000, and having paid for the same without issuing the bonds provided for by the county convention. Indeed, it may be said that the financial condition is most excellent, there being a debt of only about \$8,000 now outstanding.

HILLSBOROUGH COUNTY ALMSHOUSE AND ASYLUM.

It is a pleasure to record the fact that since the last report on the Hillsborough county institution a great change for the better has taken place, inasmuch as the old buildings at Wilton have been abandoned, and new and commodious ones



HILLSBOROUGH COUNTY FARM BUILDINGS AT GRASMERE.



erected at Grasmere. Following is a brief description of this institution:

The administration building is situated in front, or south, of the almshouse, and is 49 x 38 feet, with L, and is occupied by the superintendent and his family and the officers of the institution. The building is three stories in front, with two-story L, and a cellar extending under all. In the cellar, or basement, are the fruit and vegetable cellar, milk room, butter-making department, boiler room, where is situated the heating apparatus, wash room for help, etc.

On the ground floor of this building are the parlor, sitting-room, dining-room, office, kitchen (where the cooking is done for this building), pantry, refrigerator, etc.

The second and third floors are divided into fifteen sleeping rooms, and such other apartments as would naturally be required in a building of this kind.

The almshouse is 230 feet in length, with wings 167 feet. The basement contains ironing room, dry house, smoking room, bath room, bakery, and flour room.

On the first floor, at the right of the main entrance, are the reception room for women, sleeping rooms for women, eleven in number, dormitory, sitting-room for old ladies, clothing room, nursery, etc. On the left of the main entrance are the reception room for men, the same number of sleeping rooms for men, dormitories, chapel, toilet rooms, and in the back part of the middle wing are the dining-room and the kitchen where all the food used in the building is cooked.

The second floor, on the women's side, is used for sewing room, toilet room, dormitory, hospital, and stockroom, where the new clothing is kept. On the men's side is the school-room, the toilet rooms, dormitory, and hospital, and also two large sleeping rooms for officers. This building will accommodate three hundred persons.

BUILDING FOR THE INSANE.

The basement of this building is used for a recreation room, bath rooms, and for general purposes.

On the first floor of this building are situated the dining-rooms for the insane, serving room, sleeping rooms, toilet rooms and attendants' rooms on the women's side, while on the men's side are like rooms, except that there is no serving room. On the second floor are the sleeping rooms of each department respectively. This building will accommodate one hundred and seventy-five persons.

PRISON BUILDING.

In the basement of this building are the toilet room, smoking room, bath room, and stockroom.

The first floor contains the dining-room for men and one for the women, a dormitory for men and another for women, and two sleeping rooms for officers. On the second floor are sleeping rooms for prisoners of each department, respectively, three rooms for men and one for women.

This building will accommodate eighty men and forty women.

All the buildings are heated from the boiler room, in the west end of the laundry, which stands north of the almshouse and near to the railroad.

The buildings are heated by what is known as the Sturtevant system, also steam heat through coils. The dining and bath rooms and all other necessary places are supplied with hot and cold water.

Each building has stand-pipes and hose enough attached to each to reach to any part of the building, delivering a stream of water with a pressure of eighty pounds to the square inch. The stairways and passageways are of sufficient width to afford ample means of egress.

The buildings are lighted by electricity.

There are yards for both the men and the women connected with the almshouse and the building for the insane; also yards for the children, in which are shade or summer houses, where all have a chance in the open air.

The bedsteads are of iron, with plenty of clean clothing and a spread on each bed. In the hospital department, as also for the aged and infirm, are spring beds or wire springs.

Religious services are held on the second and fourth Sundays of each month. There is a well equipped library of reading matter, and to a certain extent newspapers are supplied to the paupers.

The out-buildings consist of stock, horsebarns, piggery, slaughter-house, blacksmith shop, carpenter shop, meat room and refrigerator, undertaker's room, and all such buildings as are necessary, all of which, together with the large buildings of the institution, are protected against fire by seven three-nozzle post hydrants with a pressure of eighty pounds per square inch, gravity, and in addition are directly connected with the steam pump.

The institution has an excellent supply of pure water, and all departments and rooms requiring it are connected with the sewer and are well trapped and of sufficient fall to keep clear running to the valley of the river below. The sanitary arrangements seem to be excellent.

A general view of the institution is given in the accompanying picture.

There are at this institution during the summer months about four hundred inmates, and in winter about six hundred and fifty. At the time of the summer inspection there were included in the above forty-seven prisoners and one hundred and twenty-five insane persons.

STRAFFORD COUNTY ALMSHOUSE.

This institution within the past few years has been greatly improved in many particulars. It has now a good system of sewerage, an abundance of good water, a practically new system of steam heating, hot and cold water for use at all times, and apparently excellent protection against fire. There is stored at all times some 120,000 gallons of water, from which several good streams can be played upon the buildings simultaneously. There are over 1,000 feet of hose, and the engine connected with the pumps is at all times practically ready for use, as a fire is kept constantly under the

boilers, so that at any time, day or night, a good hose pressure could be obtained within four or five minutes.

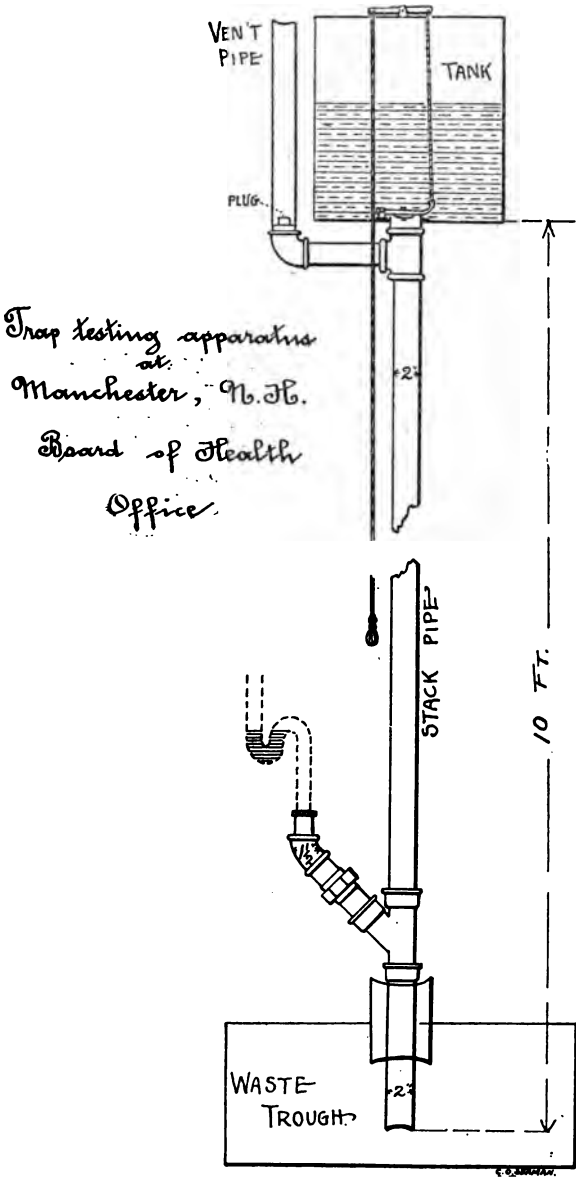
This institution has been equipped with an electric light plant, comprising an eight-horse power automatic engine, with dynamo of sufficient power to maintain 250 lights, 80 voltage. By this means all the buildings, including stables and out-houses, are lighted by electricity, so that not a lantern is used about the premises. It would seem that the danger from fire has been reduced to such an extent that the liability in this direction is very small. It may be mentioned also that the laundry has been greatly improved during the past year.

There are a few wants yet to be supplied, as is almost always the case in an institution of this kind. At the present time the greatest demand seems to be for increased hospital facilities. The quarters now occupied as a hospital are too limited and cramped, and some means should be provided to enlarge this important adjunct to the institution.

TRAPS AND TRAP SIPHONAGE.

BY WILLIAM K. ROBBINS AND CARL O. SEAMAN, OF THE
CITY HEALTH DEPARTMENT, MANCHESTER, N. H.

The plumbing trap is a device attached to the drainage fixtures to prevent sewer gas from entering the house, and usually consists of either a bend or small reservoir in the drain pipe, so arranged as to return a portion of the passing water, sufficient to close the pipe and form a seal, which will prevent the passage of gas, and which will remain continuously. The constancy of this water seal is the great desideratum. On long standing without replenishment by use of the fixture, the water evaporates, and by mechanical means the water is thrown out. This is usually called siphonage, and occurs in two ways: first, when the pipe from the fixture is completely filled by the discharging water and forms the longer leg of a siphon, so that when the water is exhausted from the fixture this weight of water in the pipe draws in a current of air after it sufficiently strong to remove the water from the trap so completely that not enough is left to form a seal; second, where the fixture is not in use, the discharge of contents of another fixture, which flows through the same main drain, and in passing produces a partial vacuum in the entering branches, on the principle of a Sprengle air pump, and to relieve the vacuum air rushes in through the trap and tends to drive the water before it, and thus break the seal. To prevent the breaking of the seal by either of these forms of siphonage, various devices have been applied to admit air without passing through the trap, which will relieve the partial vacuum in the drain. The most common and effective way is by what is called "back venting"; that is, connecting a small open pipe to the sewer side of the trap, which is carried up open to the roof of the building or to connection with

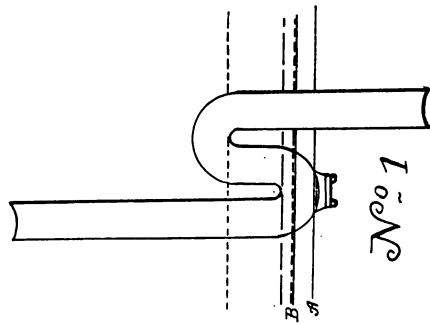


..... Line where water came to when trap was full.
A " " " " " " tested for siphonage, (vent pipe closed).
- - - - - " " " " " " trap has lost its seal.

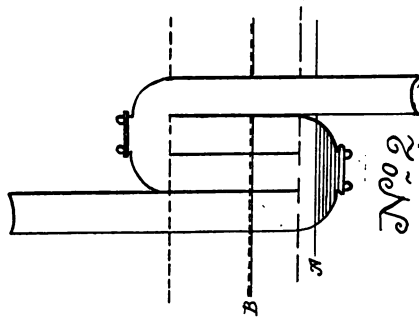
Water.

Line where water came to when tested for siphonage (vent pipe open).

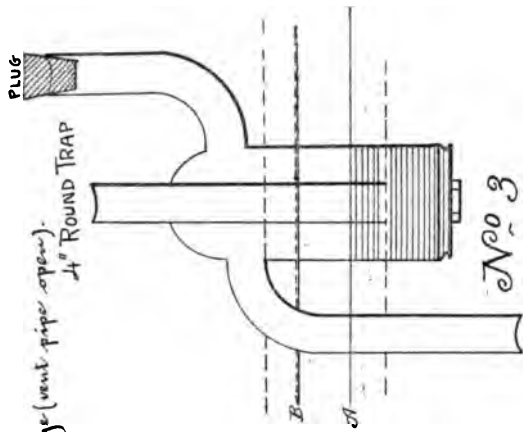
S TRAP



PAT. TRAP



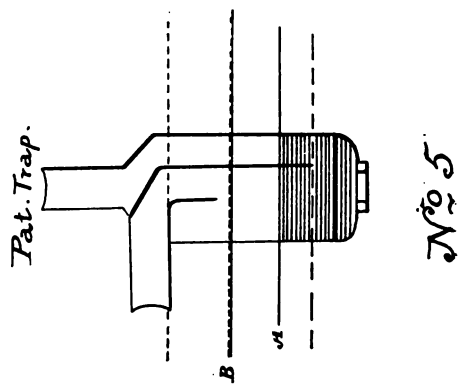
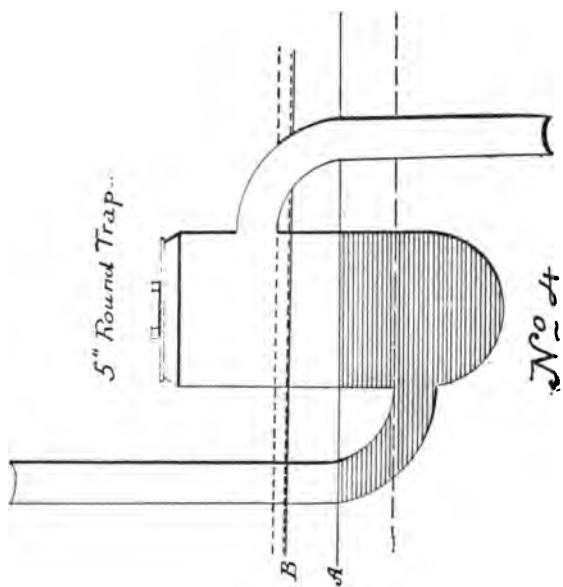
4" ROUND TRAP



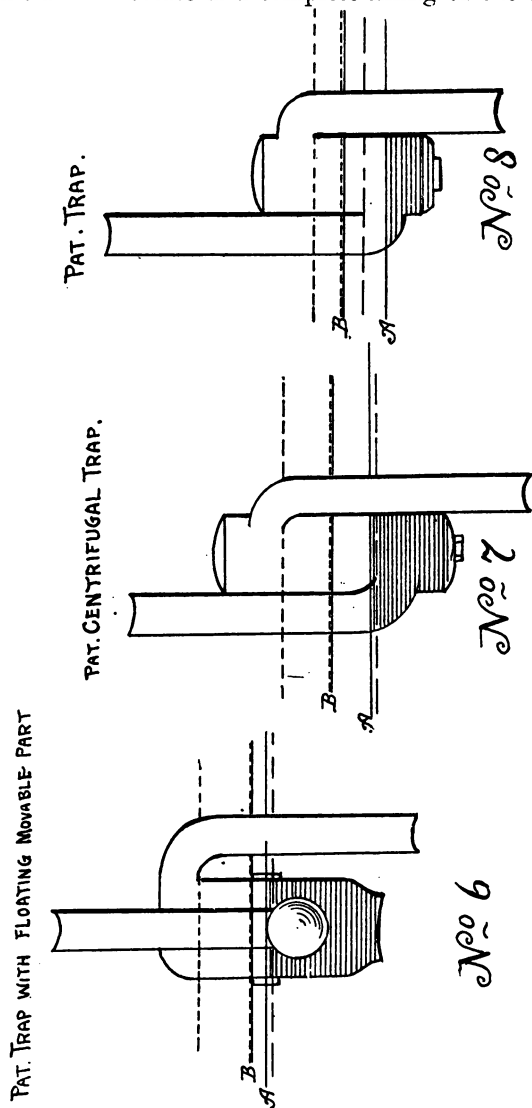
a main soil-pipe which extends through the roof. In this we have to deal with other than the principles of hydrostatic pressure, and the flow of gases and liquids through pipes.

We must take into account the force of impact, the weight and non-elasticity of water, and the lightness and extremely elastic property of gases. When these are considered we can understand how it happens that water descending through a pipe produces a partial vacuum behind it, even though the pipe be entirely open, as the water is so heavy that it descends faster than the light, elastic air will follow it. This will enable us to explain the rather paradoxical fact that an S trap may be completely siphoned when fully back-vented.

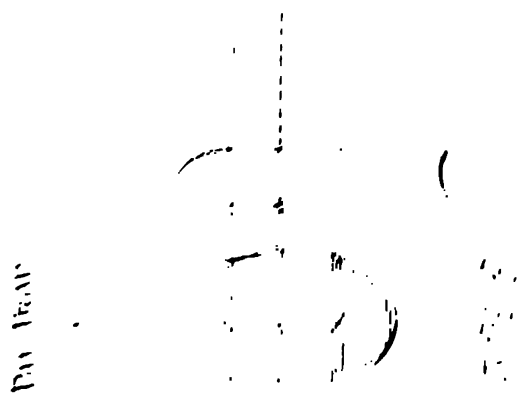
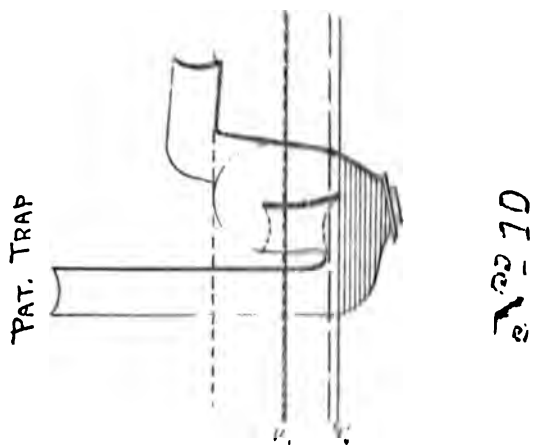
In administering the plumbing regulations of the city of Manchester, the Board of Health receives a variety of claims as to the value of different traps upon the market, with requests, of course, that a specified trap shall be recommended by the board, or that modifications of the regulations be made so as to favor this one or another, and of course promote the sale of it. It therefore becomes interesting to know something of the merits of the various traps. Little has been published in this line, and that little is the result of work done to make a showing favorable to some particular trap or device. An impartial trial upon the merits of traps could not be found, and the board requested the plumbing inspector to install at the office a device for obtaining such information first-hand. In accordance with these instructions, an apparatus was set up which, while not entirely new or original with us, we think serves fairly well the purpose of representing, on a small scale, the trials which traps may have to stand in actual use. A collection of most of the traps on the market was obtained, and provided with windows so that the contents of the traps can be observed at will. These windows are so made as not to influence the flow of water or gas, either to promote or retard it. The traps are numbered and the names omitted, as we are trying to ascertain merit and not advertise any trap or device. The apparatus consists of an elevated tank with a capacity of fifteen gallons, provided with



a two-inch discharge pipe and a clapper valve, sufficiently large to permit an immediate and complete filling of the two-inch



soil-pipe, which discharges into an open trough ten feet below. This stack-pipe is provided with a Y eight feet below the



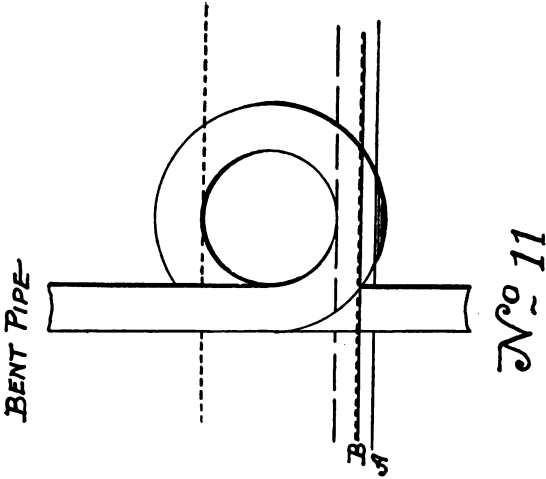
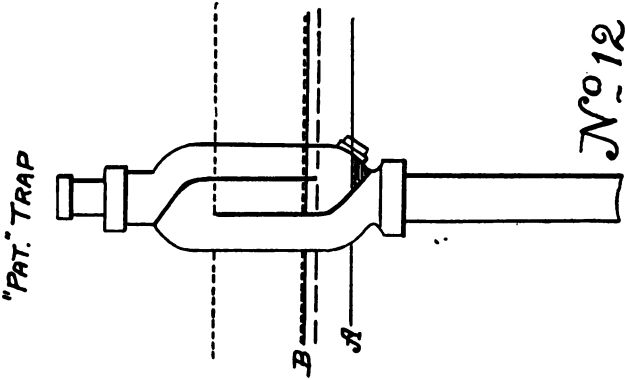
valve, and to this Y the traps to be tested are attached. This stack is also provided with a Y at the top beside the tank, which may be plugged or left open, so as to represent at will the old-fashioned, unventilated system of closed pipes, or the modern form of ventilation. To make the test, the trap is attached to the Y and filled with water. The valve is then opened until the stack is filled for a portion of its length, when the valve is suddenly closed, the descending column of water producing a partial vacuum, which tends to siphon the trap. With the plug in the top end of the stack, ten of such fractional discharges were made with a single tankful of water on each trap, and gave the following results, shown in diagram No. 1 and in the cuts of the traps.

This series of tests represents fairly well the severity of strain upon traps, experienced in the old, non-ventilated system of plumbing, especially where the plunger closets are in use. The number of fractional discharges is of little importance, since the first discharge takes the bulk of the water out of the trap, subsequent discharges taking but little additional and with some not an appreciable amount.

It will be observed that six of the twelve traps lost the seal entirely, while with three more the seal left did not exceed one fourth inch, which is a small factor of safety against even evaporation.

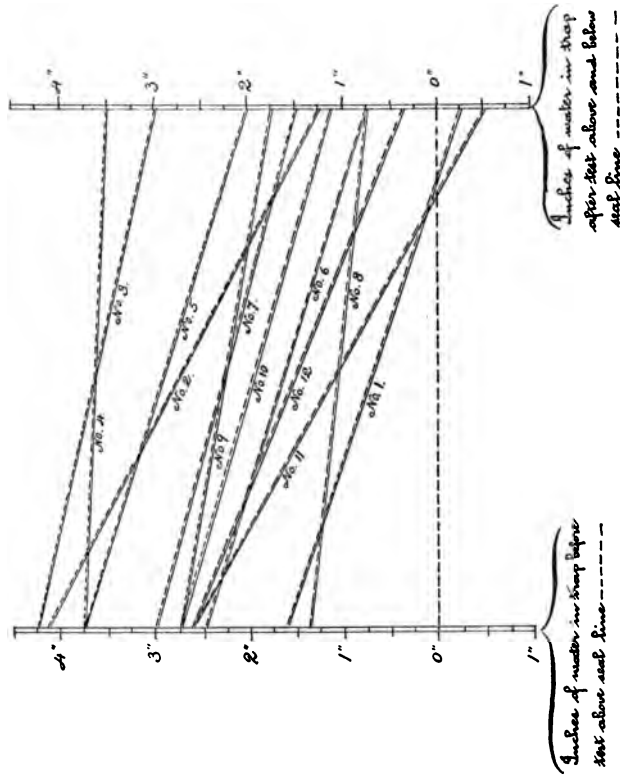
Another series of tests was made with plug removed from top of the stack, representing very nearly the conditions existing in plumbing, when the open soil-pipe extends through the roof, and fixtures are located one above another without back-venting the traps. The entire tankful of water was discharged continuously. The results are shown in diagram No. 2, and the depth of water remaining in the traps is indicated by a solid dotted line, ...

It will be observed that two traps lost their seal entirely, and in three others it is reduced to the danger line. The general conclusion to be drawn from these tests is that with the non-ventilated system of plumbing but very few traps are safe against siphonage, and these not certainly so, since they



air, and all traps should be well back-vented to be perfectly safe. Therefore, no special trap is ever recommended, the trap being chosen to suit the location and requirements, and

Result of tests made Dec. 13, 1898, showing inches of water in trap before and after one tank of about 15 gallons had been discharged into the stack pipe, vent pipe or stack open.



must always be provided with a clean-out below the water seal, or on the house side of trap. Back-venting is required when in the judgment of the plumbing inspector it is necessary, and all goes to demonstrate that in all cities the business of plumbing should be under legal regulations, both as a means of fair competition among the plumbers and as a protection to the public health.

INDEX.

INDEX.

Abatement of nuisances by legal process. By Don H. Woodward, Esq.....	185
Almshouses, county:	
Belknap	221
Carroll	223
Cheshire	223
Coös	225
Grafton	225
Hillsborough	228
Strafford	231
American Public Health Association, report of Philadelphia meeting. By Prof. Robert Fletcher, C. E.....	105
Animal diseases and animal food.....	126
Antitoxin, diphtheria, the use of.....	91
Atmosphere, lack of proper humidity of indoor.....	117
Bacillus of tuberculosis, biology of.....	2
Barber shop sanitation.....	123
Bickford, John C. The protection of domestic water supply by statute.....	202
Board of health, state, members of.....	iv
Boards of health, local.....	v
New Hampshire Association of.....	vi
Bronchitis	86
Table No. 14, showing deaths from, by age periods	87
Car sanitation.....	116
Cattle commission	xi
Cholera infantum	81
Table No. 12, showing deaths from, by age periods.....	82
Diagram No. 12, showing deaths from, by months.....	83
Conn, Dr. Granville P. Inspection of summer resorts.....	100

Consumption (see also <i>Tuberculosis</i>).....	vii, 39
a few directions to those who would avoid	
contracting	35
and the dwelling.....	26
by ages	44
by seasons	44
cause of.....	33
deaths from, by sex.....	43
defined	32
Diagram No. 1, showing percentage of deaths	
from to total mortality for the past four-	
teen years	42
Diagram No. 2, mortality from to each 10,000	
living	43
Diagram No. 3, showing percentage of deaths	
from, by age periods.....	47
Diagram No. 4, showing mortality from, by	
ages, to the living of the same age period..	48
disinfection in	37
fatality of.....	32
general preventive measures.....	36
how communicated.....	33
how prevented	33
isolation in	37
measures against the spread of.....	21
need of sanatoria.....	134
not an incurable disease.....	37
not hereditary.....	36
prevalence of.....	40
protection from.....	19
restriction and prevention of.....	1, 32
rules to be observed in.....	34
Table No. 1, showing total mortality, per-	
centage, etc.....	41
Table No. 2, showing deaths from, by months	45
Table No. 3, showing deaths from, by age	
periods	46
use of meat and milk from suspected sources	36
Croup and diphtheria.....	63
Table No. 7, showing deaths from....	64
Table No. 8, showing deaths from, by	
age periods.....	66
Diagram No. 8, showing percentage	
of deaths from to total mortality..	67

Dead, transportation of the.....	143
Diphtheria and croup.....	63
Table No. 7, showing deaths from...	64
Table No. 8, showing deaths from, by age periods.....	66
Diphtheria and croup, Diagram No. 8, showing percentage of deaths from to total mortality.....	67
antitoxin, the use of.....	91
by ages	65
by seasons and sex.....	68
Diseases of animals.....	126
contagious, diagram showing deaths from, in New Hampshire	31
improved methods of combating.....	107
Disinfectant, formaldehyde as a	122
Disinfection in consumption.....	17, 37
typhoid fever.....	61
with sulphur	62
Drainage, house, and ventilation.....	113
Engineers, civil, and sanitary science.....	162
Eyes, effect of poor window glass on the.....	131
Fletcher, Prof. Robert, C. E. Report of the Philadelphia meeting of the American Public Health Association.....	105
Fletcher, Prof. Robert, C. E. The public health.—Public rights <i>vs.</i> personal liberty in health affairs.....	149
Food, animal.....	126
Formaldehyde as a disinfectant.....	122
Glass, window, effect of poor, on the eyes.....	131
Health, a national department of.....	142
officials, laymen, suggestions for.....	177
protective associations, women's.....	143
public rights <i>vs.</i> personal liberty in affairs of.....	149
Humidity of indoor atmosphere, lack of proper.....	117
Hygrometer, indications of the.....	119
Individual drinking cups.....	131
Infection of consumption, conditions which control.....	9
Infectious diseases, what ought local authorities to do in?	12
Influenza	86
Diagram No. 13, showing percentage of deaths from to total mortality.....	89
Table No. 15, showing deaths from, by age periods	88

Inspection of meat.....	128
summer resorts. By Dr. Granville P. Conn	100
Isolation in consumption.....	16, 37
Jail, Grafton county.....	227
Legislation needed	xii
Lunacy, state board of.....	x
Measles, general precautions against.....	76
how spread.....	76
period of incubation and infectiousness.....	76
persons liable to.....	75
precautions against.....	75
during convalescence.....	78
in the sick room.....	76
regulations controlling	74
Diagram No. 10, showing percentage of deaths from to total mortality.....	72
Table No. 10, showing deaths from, by age periods	73
Meat and milk from suspected sources, use of.....	36
inspection of	128
Milk and flesh, infection in consumption by.....	9
meat from suspected sources, use of.....	36
tuberculous	25
Notification, compulsory, in tuberculosis.....	16
Nuisances, abatement of, by legal process.....	185
Pneumonia	84
Table No. 13, showing deaths from, by age periods	85
Records, preservation of.....	ix
Registration report	viii
Resorts, summer, sanitation of.....	168
Robbins, William K. Suggestions for laymen health offi- cials	177
Traps and trap siphonage.....	233
Sanatoria for consumptives, need of.....	134
Sanitation, barber shop.....	123
car	116
of summer resorts.....	168
railroad	xiv
steamboat and steamship.....	112
Sanitary science and civil engineers.....	162

Scarlet fever	68
deaths from, by seasons.....	71
Diagram No. 9, showing percentage of deaths from to total mortality.....	69
Table No. 9, showing deaths from, by age periods	70
Sewerage of Villages. By Prof. Wm. T. Smith, M. D.....	193
Shedd, Dr. G. H. Sanitation of our summer resorts.....	168
Smith, Prof. Wm. T. Sewerage of villages.....	193
Some observations on bovine tuberculosis in New Hamp- shire. By Irving A. Watson, M. D.....	209
Sputum of tuberculosis, infection by.....	6
Steamboat and steamship sanitation.....	112
Suggestions for laymen health officials. By William K. Robbins	177
Sulphur, fumigation with.....	62
Summer resorts, inspection of.....	100
The protection of domestic water supply by statute. By John C. Bickford, Esq.....	202
The public health.—Public rights <i>vs.</i> personal liberty in health affairs. By Prof. Robert Fletcher, C. E.....	149
The sanitation of our summer resorts. By Dr. G. H. Shedd	168
Transportation of the dead.....	143
Traps and trap siphonage. By William K. Robbins.....	233
Tuberculosis (see also <i>Consumption</i>).....	132
and infectious diseases, what ought the local authorities to do?.....	12
biology of the bacillus of.....	2
bovine, some observations on.....	209
compulsory notification in.....	16
conditions which control infection.....	9
disinfection in	17
infection by milk and flesh.....	9
sputum and other discharges...	6
in man.....	5
isolation in.....	16
popular instruction in.....	18
what is it?.....	2
Tuberculous milk	25
Typhoid fever.....viii, 49, 122	
by ages	54
seasons	56
Diagram No. 5, showing percentage of deaths from to total mortality.....	51

Typhoid fever, Diagram No. 6, showing percentage of deaths from to the living population, by age periods.....	52
Diagram No. 7, showing deaths from, by months	54
disinfection in	61
prevention of.....	57
Table No. 4, showing number of deaths annually, with sex and percentage.....	
Table No. 5, showing deaths from.....	53
Table No. 6, showing deaths from, by months	55
Ventilation and house drainage.....	113
Water supply, domestic, protection of by statute.....	202
necessity for a pure.....	109
the question of.....	140
works, public ownership of.....	164
Watson, Dr. Irving A. Some observations on bovine tuberculosis in New Hampshire.....	209
Women's health protective associations.....	143
Woodward, Don. H. Abatement of nuisances by legal process	185
Whooping-cough	78
Diagram No. 11, showing percentage of deaths from to total mortality.....	79
mortality by seasons.....	81
Table No. 11, showing deaths from, by age periods	80
Yellow fever	120
recommendations for a government commission on.....	110

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